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Poverty in Potato Producing Communities in the Central Highlands of Peru

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Titelfoto/ Cover photo	Farmers in Huayta Corral working on their field with a *chacitajlla;* A plate of native potatoes; Farmers harvesting potatoes.

Foreword

The Centre for Advanced Training in Rural Development (Seminar für Ländliche Entwicklung, SLE) at the Humboldt University in Berlin has trained young professionals in the field of German and international development cooperation for more than forty years.

Three-month consulting projects conducted on behalf of German and international cooperation organisations form part of the one-year postgraduate course. In multidisciplinary teams, young professionals carry out studies on innovative future-oriented topics, and act as consultants. Including diverse local actors in the process is of great importance here. The outputs of this „applied research" are an immediate contribution to the solving of development problems in rural areas.

Throughout the years, SLE has carried out over a hundred consulting projects in more than sixty countries, and regularly published the results in this series.

In 2005, SLE teams completed studies in Peru, Guatemala, Cambodia and Niger, all of which focused on results-oriented management of programs and projects and on poverty reduction.

The present study was commissioned by the German Technical Cooperation (Deutschen Gesellschaft für Technische Zusammenarbeit / GTZ) and the International Potato Center (Centro Internacional de la Papa / CIP).

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“Gottlob! Lebt der Mensch nicht nur vom Brod allein,

und auch die Ärmsten helfen sich –

Dank sey der Kartoffeln! –

doch durch.”

Albrecht Thaer (1811):
Annalen der Fortschritte der Landwirtschaft in Theorie und Praxis,
2. Jg., 4. – 6. St., Realschulbuchhandlung Berlin, 1811, S. 176

Resumen

El presente informe es el resultado de un estudio realizado en 2005 sobre la pobreza en comunidades productoras de papa en el altiplano Central de Perú. Fué llevado a cabo por el Centro de Estudios Avanzados para el Desarrollo Rural (SLE) y por el Centro Internacional de la Papa (CIP). Analiza la relación entre la pobreza y la producción de la papa.

El estudio es el resultado de la colaboración entre la Cooperación Técnica Alemana (GTZ), CIP y SLE, facilitada por el Servicio Consultivo sobre Investigaciones Agrícolas orientadas hacia el desarrollo (GTZ-BEAF). CIP es el usuario principal de este estudio.

El informe consta de 12 capítulos, incluida la introducción (capítulo 1). El objetivo principal del estudio(capítulo 2) es el de contribuir a una mejor comprensión sobre pobreza por parte del CIP. Ha sido llevado a cabo para ayudar a esta Institución a ajustar su agenda de investigación a las necesidades de sus clientes más pobres, que son en su mayoría granjeros cultivadores de papa en áreas inferiores a las 5 ha. Durante una actividad llevada a cabo para desarrollar su vision estrategíca en el 2002, CIP identificó un número de retos con respecto a los objetivos de desarrollo de cara al Milenio (MDG). En la nueva vision se persigue un amplio marco de efectos a favor de los pobres (generación de ingresos, manejo sostenible de recursos naturales, mejora de la salud), identificando sus necesidades y oportunidades mediante procesos más participativos (capítulo 3).

Una investigación participativa como el presente estudio se propone ayudar al CIP a identificar a los grupos más vulnerables, a conocer lo que los pobres consideran importante y a planificar la investigación para ayudarles a lograrlo.

Debido a su mandato, al CIP le interesan concretamente las regiones donde la producción de la papa juega un papel importante, y donde al mismo tiempo hay un índice alto de pobreza, de tal forma que la relación entre la producción de la papa y la pobreza se puedan entender mejor, y pueda tomarse en consideración de cara a la planificación de futuras estrategias de investigación. Una de estas regiones son los Andes Centrales, donde se originó el cultivo de la papa.

El informe ofrece una breve presentación de las dimensiones de la pobreza. Es más, incluye la evolución de los conceptos de pobreza considerando la misma como un fenómeno multidimensional, que es a la vez transitorio y contextual, y sus consecuencias para su análisis (capítulo 4). El reto principal de investigaciones sobre la pobreza es cómo conseguir que se escuche a los pobres?.

Como marco teórico del estudio se ha seguido el enfoque del sistema *livelihood* (*Livelihood System Approach*) para diseñar la metodología que evalúe los medios de sustento de la gente y que analice los resultados. Se ha visto que esta metodología es útil para identificar los recursos familiares, y para averiguar cómo la gente combina esos recursos (estrategias) con el fín de alcanzar ciertos resultados (consecuencias).

Para el propósito de este estudio, el concepto de bienestar, definido como lo contrario de pobreza, es el resultado deseable en la vida de la gente. El bienestar incluye además otros aspectos del sustento, tales como una menor vulnerabilidad, la seguridad alimentaria y los ingresos. ¿Qué significa sin embargo bienestar para estas personas? ¿Qué desean conseguir los pobres? ¿Qué les ayuda a conseguirlo, y qué se los impide ? Con objeto a evaluar la información proveniente de las comunidades implicadas en este estudio, el equipo SLE desarrolló, e implementó con éxito, una metodología denominada Enfoque Participativo para la Evaluación de la Pobreza (en inglés Participatory Approach to Poverty Assessment cuya sigla es PAPA, capítulo 5). PAPA se caracteriza por su apertura, no propone ningún criterio ni definición de pobreza. PAPA permite a los investigadores captar la percepción que la gente tiene sobre el bienestar, e ir más allá de una dimensión meramente material de la pobreza. PAPA también nos ofrece una vision de la importancia de la organización social de las comunidades, además de recoger información sobre su estatus económico. PAPA sirve adicionalmente para obtener la noción de las comunidades de lo que significa el bienestar para una familia en la propia comunidad (y por tanto, también, de lo que significa ser pobre). Al utilizar el concepto dinámico de pobreza desarrollado por el Stages of Progress Aprroach (Krishna, 2005), la metodología permite la explicación de cambios entre las diferentes categorías de bienestar identificadas por las comunidades.

Los puntos centrales de PAPA son: un taller con los dirigentes de las comunidades, una asamblea con la comunidad y encuestas a hogares. Para una triangulación y para reunir más información a nivel de la comunidad, se llevaron a cabo entrevistas medio estructuradas con personas clave, tales como los líderes locales, personal del área de salud y empleados de las organizaciones que están trabajando en las comunidades.

Las cuatro comunidades que participaron en el estudio están situadas en los departamentos de Junín y Huancavelica en el altiplano central peruano (capítulo 6). La región estudiada fue delimitada como zona de influencia del río Mantaro y las montañas circundantes. Esta región es muy conocida por su producción de papa y por conservar una gran variedad de la misma. La región estudiada no incluye el pie del valle, sino más bien las tierras cultivadas localizadas en las colinas y planicies dentro y alrededor del valle Mantaro en altitudes de 4.300 m por encima del nivel del mar.

Además de ser comunidades en el sentido de que son grupos de personas que viven en un mismo lugar, los grupos poblacionales que participaron en el estudio son comunidades campesinas que cuentan con una estructura política, un reconocimiento oficial, un nombre, prestan devoción a un santo y a un lugar sagrado, tienen derechos inapelables a la tierra y la necesidad de organizar proyectos de trabajo en común. La tierra es adjudicada a la colectividad; las autoridades son elegidas localmente, la comunidad define las condiciones de pertenencia, derechos y obligaciones. Esta estructura social de sustento tiene gran influencia en el análisis de la pobreza así como en las medidas que se puedan tomar para aliviarla. Hay que tenerla en cuenta no sólo al considerar el sustento individual como el objeto de análisis, sino tambien el sistema social del que estos sustentos individuales forman parte.

Adicionalmente, las instituciones y los procesos políticos facilitan o limitan las estrategias de sustento de los minifundistas. La reforma de la tierra de 1969 que transformó las hasta entonces *haciendas* en cooperativas, la privatización de la propiedad de la tierra en 1981 y el programa de ajuste estructural bajo el gobierno de Fujimori de 1990, tuvieron como consecuencia el dejar al propio criterio de los granjeros la decisión de cómo conseguir su medio de sustento. Los gobiernos en las últimas décadas han demostrado una falta de programas a largo plazo para el desarrollo agrícola, y los cambios que se han producido en este sector han obedecido más bien a intereses políticos. Hoy en día se da por sentado que los granjeros deben pagar por ciertos servicios que la mayor parte

de ellos no pueden permitirse. La caída de los precios de la papa debida al exceso de producción, el aumento de los precios de inversión, la disminución de la demanda y la recomendación del gobierno de reducir la producción de la papa, restringen en gran medida las posibilidades de los granjeros. Por otra parte, CIP, los institutos nacionales de investigación y extensión agrícola nacional (NARES), así como la cooperación de ambos a nivel de departamentos y provincias, tratan de ayudar a los granjeros a mantener la diversidad biológica de sus productos y a aumentar la producción.

El análisis de los sistemas de medios de sustento de las comunidades participantes (capítulo 7), que incluía la valoración de sus bienes y del contexto de vulnerabilidad, así como sus características económicas principales, puso de manifiesto diferencias entre las comunidades con respecto, por ejemplo, a su capital social (grado de organización comunitaria). Mientras que algunas comunidades estaban bien organizadas y sus miembros eran capaces de « preocuparse unos por otros », otras eran más individualistas con un índice mayor de iniciativa empresarial pero con menor coherencia social. El acceso al agua y la situación sanitaria (malnutrición, enfermedades, condiciones sanitarias e infraestructuras) son un problema en todas las comunidades.

La diversificación del cultivo (por ejemplo, la producción de *maca* en una comunidad) y la diversificación general de fuentes de ingreso están adquiriendo una importancia creciente entre los granjeros del altiplano. Las actividades del CIP y NARES relativas al manejo de las plagas, de las nuevas semillas de la papa, o la implementación de la producción de otros cultivos (p.ej. *maca*) fueron muy apreciadas en las comunidades y contribuyeron de forma significativa a aumentar sus ganancias.

La producción de la papa es de gran importancia económica y social en la región estudiada, así como lo es tambien en general en el altiplano central andino. En las comunidades investigadas de Huayta Corral, Aymará, Ñuñunhuayo y Casabamba, la mayor parte de la tierra cultivable se utiliza para el cultivo de la papa. Aparte de la producción de ésta, la ganadería desempeña un papel esencial en las comunidades del altiplano tanto en cuanto a seguridad contra riesgos como a generación de ingresos. El análisis de las características de la producción de la papa en las comunidades, su dinámica en los últimos quince años, así como las principales razones de la misma según las ven las comunidades, muestra diferencias entre las mismas con respecto, por ejemplo, a la diversificación del cultivo y a las presiones comunes tales como el acceso al

mercado o la vulnerabilidad a factores climatológicos o a plagas. Todavía más, todos los granjeros luchan contra la erosión o deterioro de los suelos. El sustento de los granjeros es poco sostenible debido a que ya están vendiendo su cosecha a precios por debajo de los costos de producción, reduciendo los periodos de descanso del terreno, e incrementando el uso de insumos agrícolas para seguir adelante. La diversificación, el valor añadido y las nuevas cadenas de producción (como las cadenas de mercados participativas implementadas por el CIP), así como el manejo adecuado de los recursos naturales son de gran importancia para facilitar que los granjeros consigan un medio sostenible de vida (capítulo 8).

Sobre la base del LSA, se ha investigado la pobreza, o el bienestar respectivamente, desde tres perspectivas diferentes en las cuatro comunidades: consideración de los recursos existentes, estrategias empleadas (combinación de recursos) y resultados obtenidos (capítulo 9). El análisis de los recursos y de las estrategias que siguen para hacer frente a los problemas o para adaptarse a nuevas situaciones, mostró diferencias interesantes entre las diferentes categorías de bienestar según las definen las distintas comunidades. Las percepciones de bienestar y pobreza de las comunidades, incluyendo sus nociones de líneas de pobreza, mostraron similitudes y diferencias comparándolas entre sí y con las medidas estándar de pobreza. Para trabajar con esta variada forma de entender la pobreza, las propias comunidades facilitaron la información sobre la incidencia, la dinámica y las causas de la pobreza. Aspectos que parecen contribuir en forma decisiva a no ser pobre son el género, la educación y la salud. Igualmente la evidencia sugiere que los siguientes factores contribuyen o impiden en gran manera al bienestar: el acceso a la tierra (aunque tiene menor importancia de lo que se esperaba), el acceso a ingresos provenientes de actividades no agrícolas, la tasa de dependencia familiar, la edad avanzada del jefe del hogar, el crédito y la organización comunal.

Se ha visto que el impacto de la producción de la papa en los resultados de la forma de vida -especialmente del bienestar- de las familias es esencial, ya que este producto es la base del sustento en todos los hogares en las diferentes comunidades que participaron en el estudio.

El aumento de la producción de la papa ayudó a los granjeros a mejorar su condición de vida. Sin embargo este aspecto por sí solo no terminó con el problema de la pobreza. Para escapar a ésta, el aumento en su producción tuvo

que ir unido a una estrategia orientada al mercado. El papel de la producción de la papa como medio de salir de la pobreza queda reflejado en el hecho de que el 72 % (34 de 47) de los granjeros que salieron de la pobreza afirmó que su inversión en la producción de la papa fue lo que jugó el papel más importante en la mejora de su estándar de vida. Aparte de esto, la diversificación de las fuentes de ingreso, la calidad del suelo, el uso de insumos agrícolas y la mecanización e irrigación son esenciales para sustento de los granjeros (capítulo 10).

Además del bienestar en general, se pone énfasis en la seguridad alimentaria y en la sostenibilidad del medio de vida. La sostenibilidad del sustento de las comunidades es fragil y en riesgo. En cuanto a la seguridad alimentaria, la malnutrición es mayor en hogares mas pobres que en los menos pobres, debido a dietas poco equilibradas y excesivas en carbohidratos. El nivel sanitario en general es precario, con mayor incidencia, como ya se ha dicho, entre los más pobres, impidiendo una vez más la estabilidad nutricional.

En cuanto a la relación entre el apoyo agrícola y el bienestar, se puede afirmar que las medidas para favorecer la agricultura se aplican frecuentemente de forma selectiva (capítulo 11). Los que tienen un medio de vida más pobre tienen en general menos acceso al apoyo agrícola, y sus necesidades son además distintas de los que tienen un medio de vida más estable. La investigación participativa corre a veces el peligro de que la identificación de necesidades y potencialidades se efectué sólo con los mejor situados o con granjeros ya conocidos. Los pobres indicaron tener mayor necesidad de insumos agrícolas de bajo costo que de interminables sesiones de entrenamiento. Si se quiere que las medidas agrícolas mejoren el estándar de las comunidades, se debe prestar atención especial a las diferentes necesidades de los granjeros en las diversas categorías del bienestar.

En la región estudiada, estrategias como la inversión en ganado, en la producción de papa, y en la diversidad de los cultivos y de las fuentes de ingreso (ingresos no agrícolas) son importantes en el medio de vida de los granjeros para que puedan salir de la pobreza. Su relación con el bienestar de los hogares, así como la influencia de la tenencia de la tierra, la estrategia de producción y el uso de insumos agrícolas en el cultivo de la papa son factores decisivos para el medio de vida de los granjeros.

El informe concluye con los hallazgos principales y posibles formas de intervención en el campo de la investigación agrícola y por instituciones que trabajan en el desarrollo (capítulo 12). Se identificaron varias actividades que podrían claramente ayudar a disminuir la pobreza en las comunidades participantes en el proyecto. Dichas actividades pueden contribuir a disminuir la vulnerabilidad de los hogares, a estabilizar y mejorar sus posibilidades, o a influir directamente en los resultados de las diferentes estrategias que las familias persiguen para lograr su sustento. Dado que el *livelihood* es un sistema complejo e interrelacionado, se necesitan iniciativas holísticas que tomen en cuenta la heterogeneidad de la población pobre.

Summary

The current report is the result of a study on poverty in potato producing communities in the Central Highlands of Peru conducted in 2005 by the Centre for Advanced Training in Rural Development (SLE) for the International Potato Center (CIP). It analyzes the interdependence of poverty and potato production.

The study is the result of the collaboration between the German Technical Cooperation (GTZ) - facilitated through their Advisory Services on Agricultural Research for Development (GTZ-BEAF) - CIP and the SLE. CIP is the main user of the study.

The report comprises 12 chapters, including the introduction (chapter 1). The rationale of the study (chapter 2) is to contribute to CIP's understanding of poverty. It was carried out to support the institution in adjusting its research agenda to the needs of its poorest clients, who are mainly potato farmers with less than 5 ha land. During an exercise to develop its Vision Statement in 2002, CIP identified a number of challenges with respect to the Millennium Development Goals (MDGs). In the new vision, a wider range of pro-poor impacts (e.g. income generation, sustainable natural resource management, improved health) is to be sought with needs and opportunities identified through more participatory processes (chapter 3).

Participatory research like the current study intends to support CIP in identifying the most vulnerable and what the poor themselves consider important and how to design research to assist them in attaining it.

Due to its mandate, CIP is specifically interested in regions where potato production plays an important role, and at the same time, there is a high incidence of poverty, so that the relationship between potato production and poverty can be better understood and taken into consideration for planning future research. The Central Andes, where the potato crop originated, are one of these regions.

The report provides a short overview on the dimensions of poverty. Furthermore it covers the evolution of poverty concepts regarding poverty as a multidimensional phenomenon that is both transitory and contextual and its consequences for the assessment of poverty (chapter 4). The main challenge for poverty research is: How to make the voices of the poor be heard?

The Livelihood System Approach (LSA) has been employed as the theoretical framework of the study for designing the methodology to assess people's livelihoods and for analyzing the results. It has proven useful for identifying household resources and to trace how people combine their assets (livelihood strategies) in order to attain certain results (outcomes).

For the purpose of the current study, well-being, defined as the opposite of poverty, is the desired overall outcome of people's livelihoods. Well-being also comprises other livelihood outcomes, such as decreased vulnerability, food security or income. What does "well-being" mean for the people concerned, though? What is it that the poor aspire to achieve? What helps them to get there and what keeps them from attaining it? For assessing the information needed from the communities participating in the study, the SLE-team developed and successfully applied a methodology called Participatory Approach to Poverty Assessment - PAPA, (chapter 5). PAPA is characterized by its openness, not suggesting any criteria or definition of poverty. PAPA enables researchers to capture the people's perception of well-being and to go beyond a mere material dimension of poverty. PAPA also allows, besides gathering information about the material status, for instance also an insight into the importance of social organization for communities. PAPA serves to capture collective notions of what well-being means (and thus as well what it means to be poor) for a household of the community. By employing the concept of poverty dynamics developed for the Stages-of-Progress Approach (Krishna, 2005), it allows the explanation of movements between different categories of well-being as defined by the communities.

The core of PAPA consists of a workshop with community leaders, a community assembly, and a follow-up household survey. For triangulation and additional data collection on community level, semi-structured interviews with key informants, such as the local leaders, the health care staff and employees from governmental and non-governmental organizations, which are working in the communities, were conducted.

The four communities that participated in the study are situated in the departments of Junín and Huancavelica in the Central Peruvian Highlands (chapter 6). The study region was defined as the catchment area of the Mantaro River and the surrounding mountains. This region is well known for its potato production and preserved a large number of potato varieties.

The study region does not primarily encompass the valley bottom, but rather the arable lands located on the slopes and plains in and around the Mantaro Valley at altitudes up to 4.300 m above sea level.

As well as being communities in the sense that they revolve around groups of people who live in the same place, the communities that participated in the study are peasant communities, *comunidades campesinas*, entailing a community political structure, recognition by officialdom, a name, dedication to a saint and sacred places, inalienable rights to land and the need to organize communal work projects. Land is allocated to the collectivity; authorities are chosen locally, the community defines membership, rights, and obligations. This social embeddedness of households has major implications for the analysis of poverty as well as for measures to alleviate it. It has to be taken into account, by not only considering the individual household as the object of analysis but also the social system that these individual households are part of.

Furthermore, institutions and political processes facilitate or inflict on the smallholders households' strategies. The land reform of 1969, turning former *haciendas* over to cooperatives, the privatization of land ownership in 1981 and the structural adjustment program under the Fujimori government in 1990 consequently left farmers alone with their decision of how to pursue their livelihood. The governments in the last decades have demonstrated a lack of a long-term policy for agricultural development, and changes in the sector have responded more to political interest. Nowadays farmers are supposed to pay for many extension services, which most cannot afford. Falling potato prices due to overproduction, rising input prices, sinking demand and a government recommendation to produce less potatoes heavily restrict farmers' choices. On the other hand, CIP, the National Agricultural Research and Extension Services (NARES) and the cooperation of both at department and province level, try to help the farmers preserve their bio-diversity and to increase production.

The analysis of the participating communities' livelihood systems (chapter 7), including the assessment of their assets and vulnerability context, as well as their main economic characteristics revealed differences between the communities with regard to, for instance, their social capital assets (organization). Whereas some communities were well organized and able to "take care of each other" others were more individualized with higher entrepreneurship but less social coherence.

Access to water and the health situation (malnutrition, diseases, sanitary conditions and infrastructure) were found to be problematic in all communities.

Crop diversification (for instance the production of *maca* in one community) and generally diversification of income sources shows a growing prominence among the highland farmers. CIP and NARES activities concerning pest management, new potato seed, or the implementation of Andean roots and tubers (ART) production (e.g. *maca*) were highly valued in the communities and considered to have significantly contributed to increase the communities' revenues.

Potato production is of major economic and social importance in the study region, just as it is in the Central Andean Highlands in general. In the participating communities of Huayta Corral, Aymará, Ñuñunhuayo, and Casabamba most of the arable land is used for potato cropping. Apart from potato production, livestock fulfills a crucial role for the highland communities in terms of both: as insurance against risks and as income generation. The analysis of the characteristics of potato production in the communities, its dynamics in the last 15 years, as well as the main reasons for the dynamics as seen by the communities revealed differences between the communities with regard, for instance, to crop diversification and common constraints such as market access or vulnerability to weather extremes or pests. Furthermore all farmers struggle with erosion or deterioration of their soils. Because farmers already sell their crop below their production costs, shorten fallow periods, or use more inputs to make a living, their livelihoods are far from sustainable. Diversification, value adding and new production chains (like the participatory market chains implemented by CIP), as well as natural resource management, are extremely important to allow farmers to make a sustainable living (chapter 8).

Based on the Livelihood System Approach, poverty or well-being, respectively, was approached from three different perspectives, looking at assets, strategies and outcomes of households in the four communities (chapter 9). The analysis of the asset endowment of households and the strategies they pursue in order to cope with shocks or adapt to trends, thus ensuring certain livelihood outcomes, provided interesting differences between different categories of well-being. The perception of well-being and poverty of the participating communities including their communally defined poverty lines, showed parallels, but also differences as compared with each other and with standard poverty measures. Working with this endogenous understanding of poverty, information on the incidence, the dynamics and the causes of poverty were provided by the assembled

communities themselves. Gender, education and health were found to be decisive to facilitate not being poor. Likewise, access to land (although less important than expected), access to off-farm income, dependency rate, advanced age, access to credit and community organization proved to be important factors contributing to or impeding well-being.

Since potato production is the basis of the livelihoods of all households in the communities that participated in the study, its impact on the livelihood outcomes, namely the well-being of a household, was found to be essential. Increased potato production helped farmers to improve their living situation. Increased potato production alone, however, did not necessarily pave the way out of poverty. To escape poverty, increased potato production had to be associated with a market-oriented strategy. The role of potato production for getting out of poverty is illustrated by the fact that 72 % (34 of 47) of farmers who escaped poverty stated that (investment in) potato production played the major role for the improvement of their living situation. Apart from that, income diversification, soil quality, input use, mechanization and irrigation are essential for the farmers' livelihoods (chapter 10).

Besides well-being in general, emphasis is put on food security and the sustainability of the livelihood system. The sustainability of the communities' livelihood system is extremely fragile and endangered. Concerning food security, malnourishment due to unbalanced, starchy diets is wide-spread and worse in the poor households than in the non-poor households. The health situation in general is precarious and even more so for the poor, again impeding nutrition security.

With regard to the interrelation of agricultural support and well-being, it can be stated that agricultural support measures are often selectively applied in the communities (chapter 11). Poor households have less access to agricultural support in general and have different needs than households that are better off. Participatory research sometimes implies the danger that assessment is being done with the best educated or already known farmers. Felt needs of the farmers differ for the well-being categories. Poor households showed more requests for agricultural inputs than for time-consuming training sessions. Special care has to be taken to consider the different needs of the farmers in the different categories of well-being if agricultural support measures are to improve the living standard of whole communities.

Investment in livestock, investment in potato production, and crop and income source (off-farm) diversification are important livelihood strategies of farmers for escaping poverty in the study region. Their relationship to the household's well-being as well as the influence of land tenure, production strategy and use of potato related agricultural inputs proved to be decisive factors for the farmers' livelihoods.

The report concludes with the main findings and potential entry-points for intervention by agricultural research and development institutions (chapter 12). Several activities were identified as being of high potential for poverty alleviation in the participating communities. These activities can contribute to diminish the vulnerability of households, to stabilize and improve the asset endowment, or directly influence livelihood outcomes. Because a livelihood is a complex interrelated system, holistic interventions are needed taking into account the heterogeneity of the poor.

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Acronyms

ARI	Advanced Research Institute
ARTs	Andean Roots and Tubers
BEAF	*Beratungsgruppe Entwicklungsorientierte Agrarforschung* / Advisory Service on Agricultural Research for Development
BMZ	*Bundesministerium für Wirtschaftliche Zusammenarbeit und Entwicklung* / German Ministry for Economic Development and Cooperation
BP	Became poor (category of well-being)
CGIAR	Consultative Group on International Agricultural Research
CIP	*Centro Internacional de la Papa* / International Potato Center
CONDESAN	Consortium for the Sustainable Development of the Andean Eco-region
CSO	Civil Society Organization
DAC	Development Assistance Committee
DAR	Dirección Agraria Regional
DFID	Department for International Development
ENAHO	*Encuesta Nacional de Hogares* / National Household Survey
ENNIV	*Encuesta Nacional de Hogares sobre la Vida* / National Household Survey on Life-Quality
EP	Escaped poverty (category of well-being)
FONCODES	*Fondo Nacional de Compensación y Desarollo Social* / National Fund for Compensation and Social Development
FOVIDA	*Fomento de la Vida*
GDI	Gender Related Development Index
GTZ	*Gesellschaft für Technische Zusammenarbeit* / German Agency for Technical Cooperation
HDI	Human Development Index
HPI	Human Poverty Index
IDL	*Instituto Defensa Legal* / Legal Defense Institut
IDS	Institute for Development Studies
INEI	*Instituto Nacional de Estadistica e Informática* / National and Regional Statistic Institute
INIEA	*Instituto Nacional de Investigación y Extensión Agraria* / National Institute for Agricultural Research and Extension
IPM	Integrated Pest Management
LSA	Livelihood System Approach
MAPP	Method for Impact Assessment of Programs and Projects

MDGs	Millennium Development Goals
MINAG	*Ministerio de Agricultura* / Ministry of Agriculture
MRTA	*Movimiento Revolucionario Tupac Amaru* / Revolutionary Movement Tupac Amaru
NARES	National Agricultural Research and Extension Service
NGO	Non-governmental organization
OECD	Organization for Economic Cooperation and Development
PAPA	Participatory Approach to Poverty Assessment
PRISMA	*Proyectos de Informática, Salud, Medicina, Agricultura* / Projects for Informatics, Health, Medicine, Agriculture
PRONAMACHCS	*Programa Nacional de Manejo de Cuencas Hidrograficas y Conservación de Suelos* / National Program for Catchment Area Management and Soil Conservation
RNP	Remained non-poor (category of well-being)
RP	Remained poor (category of well-being)
SENASA	*Servicio Nacional de Sanidad Agrária*
SEPAR	*Servicios Educativos Promoción y Apoyo Rural*
SL	Sustainable Livelihoods
SLE	*Seminar für Ländliche Entwicklung* / Centre for Advanced Training in Rural Development
TALPUY	*Grupo de Investigacion y Desarollo de Ciencias y Tecnología Andina* / Investigation Group for Development and Andean Technology
UNCP	*Universidad Nacional del Centro de Perú* / National University of Central Peru
UNDP / PNUD	United Nations Development Program / *Programa de las Naciones Undidas para el Desarrollo*

1 Introduction and Structure of the Report

This is the report of a study on poverty in potato producing communities in the Central Highlands of Peru conducted in 2005 by the Centre for Advanced Training in Rural Development (SLE) for the International Potato Center (CIP). It presents two main areas of focuses: poverty and potato production. The study is a result of the collaboration between the German Technical Cooperation (GTZ) through the Advisory Services on Agricultural Research for Development (BEAF), CIP and SLE.

1.1 International Potato Center

CIP was established in 1971. It is one of 15 food and environmental research Centers around the world, which make up the Future Harvest Alliance. The Future Harvest Centers receive their principal funding through the Consultative Group on International Agricultural Research (CGIAR). According to its mission statement, CIP seeks to reduce poverty and achieve food security on a sustained basis in developing countries through scientific research and related activities on potato, sweet potato, other root, and tuber crops, and on the improved management of natural resources in the Andes and other mountain areas.

CIP has recruited an international team of scientists from 25 countries, supported by nationally recruited staff. According to CIP's 2003 Annual Report there are 220 staff members in total. In its first year of operation, five donors funded CIP. Today, more than 40 donors underwrite the Center's budget. Chapter 3.2 provides a comprehensive description of CIP and CIP's research agenda. CIP is the main user of this study.

1.2 Advisory Services on Agricultural Research for Development

The Advisory Services on Agricultural Research for Development (BEAF) is a project of the German Technical Cooperation (GTZ) commissioned by the German Ministry for Economic Development and Cooperation (BMZ). BMZ is a member of CGIAR. Germany is among CGIAR's top ten investors, contributing financial, technical, and human resources.

In helping to design the German contribution to international agricultural research, BEAF conducts the following tasks:

- Advises the BMZ on collaboration within the CGIAR and the European Initiative for Agricultural Research for Development (EIARD).
- Coordinates scientific and development policy reports on research application from the international agricultural research centers.
- Supports collaboration of German scientists on projects at research centers or within CGIAR.
- Exchanges information between the international agricultural research centers and German agricultural research.
- Links and improves contacts between agricultural research centers and development projects.
- Carries out media and public relations work in Germany on agricultural research.

1.3 Structure of the Report

This report consists of 12 chapters including the introduction. **Chapter 2** explains the rationale of the study, the objectives, and the time frame.

Chapter 3 provides information on CIP's research agenda and on how this agenda has been influenced by CIP's vision exercise.

Chapter 4 provides a conceptual framework on poverty. It discusses the main concepts available to study poverty emphasizing the importance of listening to the poor themselves. It also describes the Livelihood System Approach (LSA). The livelihood approach builds the theoretical background of the study and it was used for designing the methodology and for analyzing the results.

Chapter 5 presents the methodology used in this study. The study is based on secondary information at department level and on primary information at community level. For gathering the information needed from the communities, the SLE team developed a methodology called Participatory Approach to Poverty Assessment (PAPA).

Chapter 6 provides the profile of the study region at department and province level. It presents the natural characteristics of the study region as well as a socio-economic analysis. The main agricultural products in the region and the dynamics of potato production are also described in this chapter.

In addition, the chapter discusses the activities conducted by CIP, by the National Agricultural Research and Extension Services (NARES) and by CIP in cooperation with NARES at department and province level.

Chapter 7 contains the profile of the participating communities including the analysis of their assets and vulnerability context as well as their main economic characteristics. It also provides information on the most important crops and the activities of CIP and NARES at community level.

Chapter 8 presents the main characteristics of potato production in the communities, its dynamics in the last 15 years and the main reasons for the dynamics.

Chapter 9 describes the poverty perception of the participating communities including their commonly agreed poverty lines. The asset endowment on the household level is analyzed in order to capture the dynamics of, and reasons for, poverty. This chapter also discusses the strategies households follow in order to cope with – or adapt to – seasons, trends, and shocks.

Chapter 10 links poverty and agriculture. It discusses the role of agriculture in general, and of potato production in particular, for the well-being of a household. Besides well-being in general, emphasis is put on food security and sustainable use of the natural resource base.

Chapter 11 provides information on agricultural support in the participating communities and for the different categories of well-being. Furthermore farmers' interest to adopt new technologies and their perceived needs are presented. This can serve as a base for future interventions.

Chapter 12 presents the main findings and potential intervention opportunities.

2 Rationale and Objectives of the Study

2.1 Justification of the Study: CIP's Challenge to contribute to the MDGs

In the year 2000, the international community under the leadership of the United Nations (UN) defined eradication of poverty and hunger as the highest-ranking Millennium Development Goal (MDG). Agriculture is central to poverty reduction, food security and economic development and hence poverty alleviation is also stated as the first priority of International Agricultural Research Centers of the CGIAR.

During an exercise to develop its Vision Statement in 2002, CIP identified a certain number of challenges with respect to the MDGs (Box 2.1).

Box 2.1: The Challenges to CIP

- "CIP can contribute to halving the proportion of the population in extreme poverty between 1990 and 2015—that the population living in poverty be less than 15 % by 2015 (Target 1).
- CIP can contribute to halving, between 1990 and 2015, the proportion of people who suffer from hunger (Target 2).
- CIP can contribute to reducing by two-thirds, between 1990 and 2015, the under-five mortality rate (Target 5).
- CIP can contribute to reducing by three-quarters, between 1990 and 2015, the maternal mortality ratio (Target 6).
- CIP can contribute to integrating the principles of sustainable development into country policies and programs and to reversing the loss of environmental resources (Target 9).
- CIP can contribute, by 2020, to achieving a significant improvement in the lives of at least 100 million slum dwellers (Target 11).
- CIP can contribute to addressing the special needs of the least developed countries (Target 13).
- CIP can contribute, in cooperation with the private sector, to making available the benefits of new technologies, especially information and communications technologies (Target 18)".

Source: CIP, 2003:8

In order to meet these challenges, the need of a more comprehensive approach for targeting interventions was identified: "In previous targeting exercises research needs have been scientist-driven and constraint-focused (e.g. potato late blight), with ranking for quantitative (economic) impact. In the new vision, a

wider range of pro-poor impacts (e.g. economic growth, empowerment) will be sought with needs and opportunities identified through more participatory processes" (CIP, 2003:28).

To be able to focus their research activities on poverty reduction, CIP researchers need to have a deep and comprehensive understanding of poverty, its dynamics, and causes. As poverty is a social construct, efforts to analyze it have to take into account that different cultures have different perceptions. Even within a certain society the persons or households considered to be poor are not homogeneous but suffer from different degrees and from different causes of poverty and – in order to be able to escape from this situation – require different kinds of support.

CIP researchers are therefore confronted with the task of learning how people in different parts of the world perceive poverty and how and why they have moved in and out of poverty. In this context they are specifically interested in regions where potato production plays an important role and which at the same time have a high incidence of poverty, so that the relationship between potato production and poverty can be better understood and taken into consideration for planning future research. The Andes are one of these regions.

In this framework CIP and BEAF welcome and support the SLE study on understanding poverty in potato producing communities in the Mantaro Valley. The Mantaro Valley is a potato-growing region in the central highlands of Peru where CIP has a research station, is undertaking a number of research activities and is in the process of planning further research projects.

Taking this context into account the study is designed to serve two purposes:

- It contributes to CIP's ongoing process of institutional learning with regard to the understanding of poverty. By analyzing the degree, dynamics and causes of poverty in four communities it provides a case study, which facilitates that CIP researchers have access to information on how poverty related issues are perceived by the population of a specific region. This information – especially when complemented by similar studies in other potato-growing regions – will contribute to a deeper understanding of the complexity and heterogeneity of poverty.

- For CIP's activities in the Mantaro Valley – and especially for the activities in the participating communities – the information provided by the study is a situation analysis, which can be used for reviewing the poverty relevance of past and ongoing research and for planning future activities. The information is also relevant for the activities of the national agricultural research and extension services (NARES), assuming that these organizations are also facing the challenge of contributing to the MDGs.

2.2 Objectives and Timeframe of the Study

In order to meet the purposes, the SLE team has covered a number of areas of investigation. They are formulated as results according to the logical framework (Annex I):

1. The CIP's research agenda, focusing on activities related to the potato crop in the study area has been described.
2. The communication channels in the study region concerning potato production among CIP, main NARES, and farmers have been described.
3. A participatory methodology to analyze poverty and the role of potato production has been developed and tested.
4. The degree, dynamics, and causes of poverty in the study region have been identified.
5. The dynamics of potato production in the study region has been described.
6. The role of potato production on welfare for different categories of households in the study area has been assessed.
7. Farmers perceived needs with regards to agricultural support in the study region have been documented.
8. Appropriate feedback to the participating communities / farmers has been provided.

The above-mentioned results are documented in this report. On the basis of the expected results guiding questions for each area of study were formulated and agreed with CIP researchers. The guiding questions were refined and reformulated several times in an iterative process and helped to focus the data collection. An important part of this process were frequent discussions of the study design, of the methodological approach, of intermediate results and of the draft version of the study with CIP researchers and representatives of BEAF, of the Faculty of Agricultural and Horticultural Sciences of the Humboldt University and of the SLE.

The main activities related to the study were:

- Two weeks preparation trip to Peru in June 2005 by the team leader to clarify the topic and expected outputs of the study,
- Six weeks preparation of the SLE team in Berlin (June 13-July 22) concretizing the objectives, outputs, time frame of the study and developing a conceptual framework and the methodology,
- Three months implementation of the study design in Peru (July 31–October 29), and
- Presentations of the results at CIP's headquarters in Lima (October 21), at the SLE (November 9), and at the Faculty of Agricultural and Horticultural Sciences of the Humboldt University (November 10).

3 Agricultural Research and Development at CIP

What does agricultural research and development at CIP mean? A short reflection of the broader context of international research and development (3.1) serves as basis for a description of CIP's current research and development cycle and the resulting research agenda (3.2). A brief review of the relevant CIP study approaches in the field of potato production and poverty helps to understand from which context the idea for the current study has emerged (3.3). A crucial element at the interface between research and development at CIP are the strategies of dissemination of research results (3.4).

3.1 The Relationship between International Agricultural Research and Development

The dynamics of the relationship between agricultural research and development in the past 30-40 years are pretty well mirrored in the history of CGIAR. This is true, even though the context in which CGIAR operates has also been evolving with the appearance of other stakeholders interested in the issue of agricultural research and development in developing countries. Over the past two decades the Organization for Economic Co-Operation and Development (OECD), the Inter-American Development Bank (IDB), the World Bank, and various United Nations agencies, as well as non-governmental organizations (NGOs) and governments in both developed and developing countries implemented the "Innovation System Approach"[1]. They shifted their attention away from research and the supply of science and technology, towards the whole process of innovation, in which research is only one element (Dantas, 2005).

The CGIAR grew out of the initial international response to widespread concern in the 1950's, 60's and early years of the 70s that many developing countries would succumb to famine (CGIAR, 2005). The "Green Revolution", which was based on international research, brought unprecedented harvests in parts of Asia

[1] An innovation system is a network of organizations within an economic system that are directly involved in the creation, diffusion and use of scientific and technological knowledge, as well as the organizations responsible for the coordination and support of these processes (Dantas, 2005).

and Latin America, with new varieties of rice wheat, and maize. Although soon it became evident, that the "Green Revolution could not escape the law of diminishing returns" (Lipton, 2005:9), the predictions of "gloom and doom" were replaced by a "hope and optimism", that the scope of agricultural transformation could be extended worldwide (CGIAR, 2005). CGIAR was founded to contribute through its research to the prevention of famines and to support technologies that can potentially increase food production in the food deficit countries.

Even though the CGIAR founding resolution declared, that "account will be taken not only of technical, but also of ecological, economic, and social factors", in the first decade (1971-1980) a somewhat reductionist emphasis was laid on "increasing the pile of food" by introducing new varieties and pesticides. The CGIAR Centers were conceived as generating widely applicable technologies, which could be delivered to national agricultural research systems (NARES), adapted and further extended to and massively adopted by farmers. This approach became known as "Central Source Model" (Thiele et al., 2001:429). Primarily giving highest priority to cereals, soon the research portfolio was broadened to include other food crops[2]. At the end of the first decade CGIAR branched out into new areas of activities such as livestock research, farming systems, conservation of genetic resources, plant nutrition, water management, policy research and services to national agricultural research centers in developing countries (CGIAR, 2005).

In the second decade (1981-1990), it started to become evident, that the emphasis on "increasing the pile of food" and the "Central Source Model" were not appropriate to tackle the complexity of factors, influencing agricultural development in marginal and ecologically varied conditions. At the same time environmental problems in the "revolutionized" agriculture became severe. This was reflected in the new objective of research, which was defined as "increasing sustainable food production in developing countries in such a way that the nutritional level and general economic well-being of the poor are improved. This approach called for a more direct focus on poverty, as well as greater emphasis on protecting biodiversity, land, and water" (CGIAR, 2005).

[2] Such as rice, wheat, maize, cassava, chickpea, sorghum, potato, millets and pastures.

While having a “Central Source” emphasis, with participatory research – by involving farmers at an early stage in the process – alternative approaches to agricultural research came up. In this time, with its “farmer-back-to-farmer” approach CIP had a renowned leading role in “participatory research” among the CGIAR Centers (Thiele et al., 2001:429) (3.3).

The single CGIAR Centers were encouraged to use multidisciplinary approaches, to increase internal cooperation, to strengthen national research capabilities and to collaborate with other institutions in an emerging global agricultural research system. Key elements of research guidelines were:

- Enhancing sustainability through resource conservation and management,
- Increasing the productivity of commodity production systems,
- Improving the policy environment, and
- CGIAR’s areas of activity further expanded, to include agro-forestry, fisheries, water management, and banana / plantain (CGIAR, 2005).

In the beginning of the 1990’s it became clear, that the expectation of CGIAR pioneers – solving the problems of food shortage and agricultural development in tropical developing countries by delivering technologies for increased production within 20 years – had been far too optimistic.

The third decade of CGIAR (1991-1999) was characterized by concerns, doubts, and disputes concerning targeting, organization and impact of research as well as linkages with national agricultural research systems in developing countries (NARES) and with civil society organizations. These discussions on the directions and ways of necessary adaptations of research and agricultural development strategies were reflected in the different mission statements of the decade.

The reformulated mission statement of 1991 reads as follows: “Through international research and related activities, and in partnership with international research systems, [CGIAR seeks] to contribute to sustainable improvements in the productivity of agriculture, forestry and fisheries, in developing countries, in ways that enhance nutrition and well-being, especially of low-income people” (CGIAR, 2005). In this period a reemphasis on strategic research and collaboration with “center’s stakeholders” was noted, which raised the question, if this “could lead to cutting back 'participatory research' initiatives just as they were becoming established” (Thiele et al., 2001:429).

Alongside the collapse of aid to agriculture[3], international agricultural research funding stagnated from the 1980's to the early 2000's (Lipton, 2005:1). After a period of little political support and a financial crisis of CGIAR, in 1995 a high Ministerial-level meeting, held in Lucerne (Switzerland) reaffirmed the importance of agriculture as both, a catalyst and an integral part of development, with agricultural research serving as an indispensable component of agricultural development. As part of the Lucerne Declaration an amended mission statement of CGIAR was formulated: "To contribute, through its research, to promoting sustainable agriculture for food security in the developing countries" (CGIAR, 2005). In 1997, a CGIAR vision exercise was conducted. It resulted in a revised vision statement, which reads: CGIAR seeks "to achieve sustainable food security and reduce poverty in developing countries through scientific research and research-related activities in the fields of agriculture, forestry, fisheries, policy, and environment" (CGIAR, 2005).

The fourth and present decade was initiated by the UN-resolution of the MDGs, which put prior emphasis on CGIAR's need to contribute to poverty eradication. The present CGIAR mission statement then reads: CGIAR seeks "to contribute to food security and poverty eradication in developing countries through research, partnerships, capacity building, and policy support, promoting sustainable agricultural, development based on the environmentally sound management of natural resources" (CIP, 2003:3). This should be reached while maintaining science and research at highest levels, strengthening the role of CGIAR as a producer of global public goods, guaranteeing agility, responsiveness and cost-efficiency of Centers and devising most effective means of linking CGIAR-supported research with the development programs of countries of the south (CGIAR, 2005).

Although the "Central Source Model" has been under attack, it is implicitly highly influencing CGIAR thinking (Thiele et al., 2001:429).

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[3] For agriculture, including forestry and fisheries, the proportion of sectorally allocable aid disbursed fell from 20.2 percent in 1987–89 to 12.5 percent in 1996–98. The proportion of OECD bilateral aid disbursed to agriculture fell from 12.4 percent in 1982–83 to 3.7 percent in 2002–03 (OECD 2004). Total aid disbursed to agriculture in 1990 prices fell from US$9.2 billion in 1980–84 (17 percent of all aid) to $3.9 billion (6 percent) in 2000 (OECD 2001). And total aid committed to agriculture under FAO's "broad" definition fell from 16.3 to 9.1 percent of aid in 1988–99, and, under the "narrow" definition, from 9.1 to 4.5 percent (OECD 2003), (all information taken from Lipton, 2005:9).

Since the agricultural landscape in the developing world is dominated by small farms, which provide the most important source of employment and income to the rural poor and yet smallholders remain highly susceptible to poverty and hunger, the "participatory research" approach is supposed to play a crucial role for achieving CGIAR's objectives, though (Lipton, 2005:14 and Horton et al., 2000:19).

3.2 CIP's Research and Development Cycle and Research Agenda

Among the CGIAR Future Harvest Centers, CIP has the mandate to conduct research on potato, sweet potato, Andean roots, and tuber crops (ARTs). The regional focus is on hillsides, mountain, and urban agricultural systems.

After the 2003 vision exercise CIP faces new challenges (Box 2.1). In order to contribute to poverty eradication, hunger alleviation, human health, and rural and urban sustainability, CIP's Research and Development Program was realigned. It is reflected in a "Pro-Poor Research and Development Cycle" (R&D-cycle) (Figure 3.1), which is in the process of being implemented. It is an iterative mechanism, which is supposed to ensure institutional learning in CIP's research agenda (CIP, 2003:22).

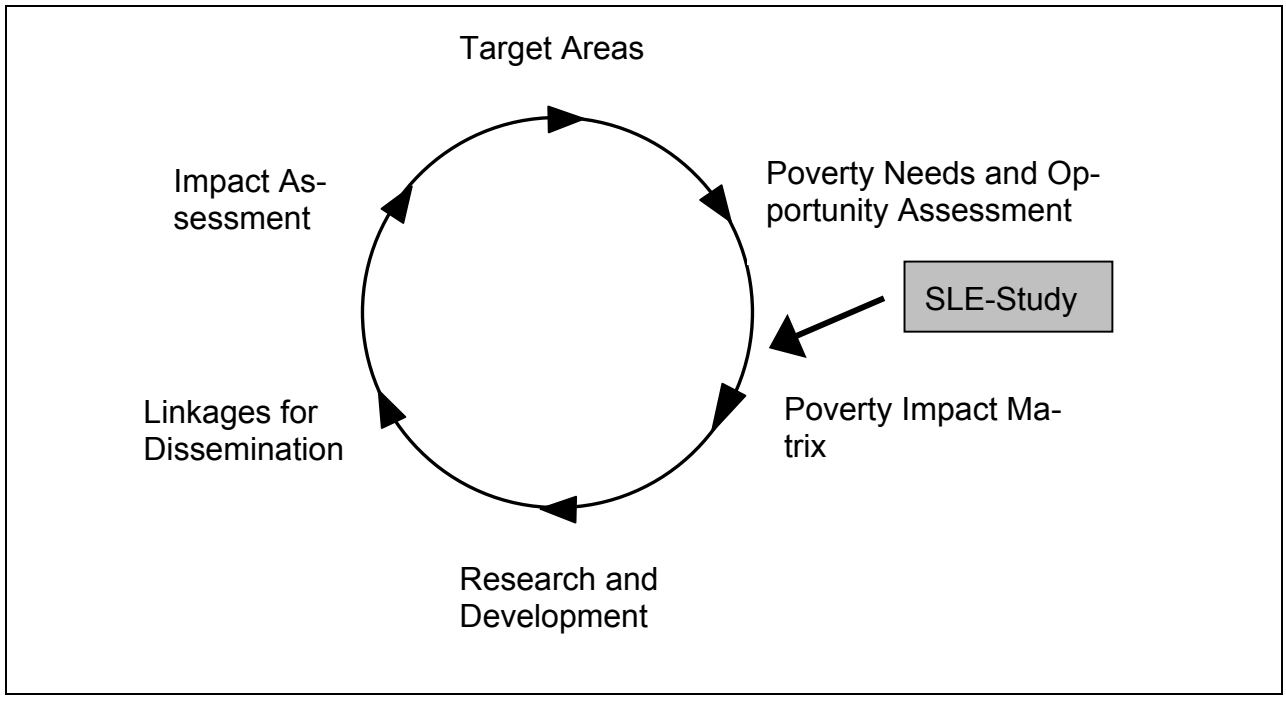

Figure 3.1: CIP's Pro-Poor Research and Development Cycle" and integration of SLE-Study (Adapted from CIP, 2004: 83)

The R&D-cycle starts with an impact targeting in order to identify priority areas, populations or systems at macro-level. A global geographical targeting allows answering the question, where CIP's research and development activities should be prioritized. This geographical targeting is conceptually an overlaying of a poverty-map, a map of CIP-mandated crops and an environmental vulnerability map, referring to ecosystems, in which CIP develops activities. Based on these three criteria, and the probability of achieving impact, potential geographical areas for CIP's intervention can be identified (CIP, 2003: 23). CIP identified eight priority areas, in regions such as the tropical Andes, East and West Africa, Central and South, East and West Asia, including China, India, and Indonesia (CIP, 2004:20).

After this macro-level priorization in the R&D-cycle, follows an area-specific poverty needs and opportunity assessment at the meso-level. The result of this process is expected to be a list of priority needs of resource-poor people and the identification of those needs that CIP-related interventions could address. This process is supposed to be highly participatory and shall include traditional CIP-partners, as well as key stakeholders experienced in poverty related issues (CIP, 2003:24).

In a next step, a matrix to identify pro-poor R&D-activities for the selected geographical targets at the micro-level shall be developed, including both continuing and new activities.

From the above-mentioned analysis the research and development agenda shall be derived or adjusted. Research outputs are linked to development partnerships for more efficient and effective dissemination (3.4). The impact monitoring and assessment establishes indicators and, by analysis and evaluation of these, is conceptualized to enable redirection of efforts during the R&D-process to maximize the probability of achieving the expected impacts (CIP, 2004:83).

In order to make the implications of CIP's R&D-cycle operative, a realignment of the program structure took place. To achieve "a more streamlined research management, [which is] robust enough to persist and maintain its relevance in the face of a dynamic external environment", six research divisions have been defined (CIP, 2004:84). Box 3.1 gives a short overview on their principal projects and activities.

In an effort to help scientists to tackle the new challenges, CIP established the "Impact Enhancement Division" in 2003. Its main function is to improve targeting and to monitor impacts. Such an impact assessment is supposed not only to evaluate impact in economic terms, but should go beyond this, by including other types of impact, such as related to health or social aspects. By performing these tasks, the division serves as "the compass for the program, conducting research to monitor progress and increase impact in each of the regional settings" (CIP, 2005a).

Still, even in the light of the new challenges, activities conducted by the "Genetic Resources Conservation and Characterization Division", which guarantees the "non-negotiable core responsibility" of CIP, and the "Germplasm Enhancement and Crop Improvement Division" remain CIP's foundation (CIP, 2004:85).

The "Integrated Crop Management Division" undertakes research to integrate solutions to the main biotic constraints of potato and sweet potato; such as late blight, bacterial wilt, viruses, insect pests, and includes aspects related to soil management. Integral interventions can be more efficient, than constraint-based approaches to help farmers in terms of productivity and income enhancement. Such integrated solutions need to be appropriate for the regional context, the target systems, and to the socio-economic frame conditions of the target population (CIP, 2004:85).

The "Natural Resources Management Division" also conducts integrated research. The main aim is to gain a better understanding of production systems (e.g. potato, sweet potato), within the complex agro-ecosystems in which they are embedded. This division develops strategies and tactics for intervening in these complex systems that are supposed to enhance long-term impact (CIP, 2004:85). The current challenge is how to best facilitate the conversion of targeted potato- and sweet potato-based systems into resilient agro-ecosystems, i.e. systems with the capacity to absorb shocks and adapt to change while maintaining their function (CIP, 2005b).

Box 3.1: CIP's Research Divisions and their principal activities

Impact Enhancement

- Characterizing user needs and opportunities for agricultural knowledge and technology.
- Assessing dissemination strategies, adoption, and impact.
- Adding value to commodities through post-harvest innovations.
- Institutional learning for pro-poor impact.

Genetic Resources Conservation and Characterization

- Collecting and conserving genetic resources.
- Assessing genetic resources diversity.
- Characterizing genetic resources.
- Collaborating on genetic resources policies and capacity building.

Germplasm Enhancement and Crop Improvement Division

- Enhancing potato germplasm and crop improvement.
- Enhancing sweet potato germplasm and crop improvement.
- Improving root and tuber crops through transgenic.
- Improving adaptation and variety use.

Agriculture and Human Health

- Analyzing linkages among production, ecosystems, and human health.
- Enhancing human health benefits from agricultural production.
- Mitigating risks to human health from agricultural production.

Natural Resources Management

- Characterizing the sustainability of targeted agro-ecosystems.
- Examining external disturbances of targeted agro-ecosystems.

  Designing and validating resilient agro-ecosystems.

Integrated Crop Management

- Integrated management of the potato crop.
- Integrated management of the sweet potato crop.

Source: CIP (2004):85

In 2003 CIP became the first CGIAR center that fully integrates crop and natural resource management research with human health. Based on the research results of the "Agriculture and Human Health Division" intervention strategies are designed to increase the benefits and mitigate the risks of agricultural production to human health. This division is expected to play an especially important role in CIP's efforts to reduce infant maternal mortality and improve the lives of the urban poor (CIP, 2004:33). In addition to this, CIP traditionally creates, coordinates, and participates in partnerships (3.4).

3.3 Relevant CIP Studies on the Role of Potato Production and Poverty Reduction

The current SLE study with its comprehensive approach to understand the socially constructed concepts of poverty and the role of potato production in small farmers' perception is a novelty for CIP. It is supposed to contribute to a process of institutional learning and consequent orientation to poverty alleviation, initiated by CIP's 2003 Vision Exercise (2.1 and 3.2).

The practice, though, of orienting CIP's research activities to farmers' needs and assessing impacts on target groups is of rich tradition at CIP. The current study benefited to a large extent from previous CIP studies and gained experiences.

From the late 1980's on, when resources for agricultural development and research declined, impact assessment of technologies delivered by CIP has become a vitally important issue for the institution. Soon efforts in impact assessment were not only conducted to satisfy donors' concerns, but it was rather understood as crucial for "maintaining an institutional critical mass capable of effectively contributing to poverty alleviation and environmental sustainability" (Walker and Crissman, 1996:V). CIP has released a series of economic impact studies on CIP technology in the different target areas. These studies estimate the economic benefit of the application of CIP innovations for the target group (e.g. Fuglie et al., 2001 or Ortiz et al., 1996).

Apart from such studies, covering merely the economic effects of CIP technology in target areas, CIP has been pioneering in CGIAR in "participatory research". By actively involving the users of technology together with scientists in developing new technology (Thiele et al., 2001:2), farmers' needs and values became integral part of CIP's research activities. A prominent example for "participatory research" at CIP is the so called "farmer-back-to-farmer" model (Box 3.2), as pursued by Rhoades et al. (1988) in a study on traditional potato storage in Peru. The philosophy of this approach can be summarized by the motif that agricultural research must begin and end with the farmer (Thiele et al., 2001:431). An alternative, but complementary participatory approach, which built on the experiences gathered by an "agronomic constraints team" in the Mantaro Valley, was the "Optimizing Potato Productivity" project (Thiele et al, 2001:431).

Recent studies have measured the impact of specific participatory interventions such as the Farmer Field Schools (FFS). Studies showed that this type of interventions can generate substantial benefits for farmers, not only in economic terms but also in terms of human and social capital (Ortiz et al., 2004, Godtland et al. 2004, Zuger 2004), but scaling up is the main challenge.

Box 3.2: The principal four stages of the "farmer-back-to farmer" (FBF) model

In FBF, farmers themselves form equal members of the problem solving team, which begins with existing practice. There are four principal stages:

1. **Diagnosis:** Using a range of methods including on-farm experiments, farmer field days, farmer advisory boards, and participant observation.
2. **Developing potential solutions:** Linking on-station and farm-level research.
3. **Testing and adapting the solutions to local conditions:** The farmer acts as an adviser, with a continuing flow of information between station and the field.
4. **Farmer evaluation and adaptation:** Collection of information on how farmers accept, adapt, and modify the technology.

Source: Adapted from Thiele et al., 2001:431

Mayer (1979) released an extensive and comprehensive study on agro-ecological, social and economic aspects of small farmers in the Mantaro Valley, with special reference to potato production. Even after taking positions outside of CIP's social science unit, he has dedicated his interdisciplinary work to peasant household economies in the Andes with a focus on potato production (e.g. Mayer et al., 1992 and Mayer, 2002).

3.4 CIP's Dissemination Strategies

3.4.1 Partnerships

Dissemination of CIP's research results is mainly conducted through partnerships, training sessions, and publications.

CIP initiates, coordinates, and participates in many partnerships. Several hundred collaborating partners like NARES, Advanced Research Institutes (ARIs), NGOs, Civil Society Organizations (CSOs), and the Private Sector contribute to CIP's impact and presence around the globe (CIP, 2005c). Besides this a number of CIP initiatives benefit from the contributions of extensionists, farmers, consumers, NGOs, policy makers, and enterprises, all of which help to strengthen the crucial link between research and implementation.

CIP's decentralized organization enables researchers to develop technologies where they will be most readily used, and with the people who will most quickly adopt them. Increasingly, this includes farmers, communities, and local NGO's.

The main goal of Partnership Programs and Initiatives is an institutional learning process for pro-poor impact. Accordingly they serve as "primary update and utilization platforms for research results, increasing the dissemination and scaling out of the public goods produced by CIP and enhancing the development impact" (CIP, 2004:84). Currently CIP coordinates and hosts the following Partnership Programs and global or regional initiatives:

- Urban Harvest
- Global Initiative on Late Blight (GILB)
- CONDESAN (Consortium for the Sustainable Development of the Andean Eco-region)
- VITA A (Vitamin A for Africa)
- PRAPACE (Regional Potato and Sweet Potato Improvement for East and Central Africa)
- UPWARD (Users' Perspectives with Agricultural Research and Development)
- Global Mountain Program (GMP)
- Papa Andina

The partnership programs CONDESAN and Papa Andina are regionally focused on the Andean Mountain Region. CONDESAN is an association of partners of the public and private sector of the Andean Countries from Venezuela to Argentina. The members of this association facilitate and implement concerted actions in the field of investigation, capacitating, development, and political initiatives, which support the socio-economically sustainable advance. The final aim is to diminish inequality and to contribute to the well-being of the population of the Andean eco-region (CONDESAN, 2005).

Papa Andina gives special attention to technological innovation to improve small-scale farmer production capacity, while ensuring pro-poor growth and focusing on gender and empowerment issues. The overall objective is "to improve the capacity of partners in managing technological and institutional innovation processes to respond to demands from poor farmers, potato market chain actors and development institutions taking advantage of regional experiences" (CIP, 2005d:1).

Commodity networks, consortiums, and other regional organizations have proven to be effective mechanisms for research planning and horizontal exchange of technology. Therefore, CIP Latin America, like all other CIP regional programs, seeks to support these associations in order to strengthen their capacity to generate and transfer technology. Strong NARES in Latin America are partners in CIP's research and training efforts for the less-developed countries of the region.

3.4.2 CIP's Training Unit

One important part of CIP's dissemination is the training of scientists and students. CIP's training program is a vehicle for interaction and collaboration with a wide range of partners facilitating the achievement of the Center's objectives. It is strongly linked with the research agenda and responds to partners' needs for enhanced research skills and methods. Since its foundation, CIP has conducted workshops, courses, and seminars worldwide – attended by almost 20,000 participants.

CIP training aims to:

- Increase local capacity by providing courses and workshops on the use of new technologies.
- Provide forums for information exchange.
- Give access to scholarships and fellowships.
- Provide advanced research facilities for use of improved research and disease detection methods.

Training topics include crop production and crop protection, the improved management of natural resources in mountain areas and the conservation of genetic resources for commodity crops. CIP training also focuses on the development of healthier, more self-sustainable national seed systems. The training program's continuous aim is the creation of an international network of highly capable research scientists able to conduct independent studies, to offer skills training to others, and to collaborate effectively in the CIP global community of interest (CIP, 2005e).

In recent years, CIP has included distance education, using the latest information technologies to extend its reach and multiply possibilities for knowledge dissemination. CIP's training materials include digitalized manuals and papers, videos and interactive media such as CD-ROMs, on-line courses, and forums.

3.4.3 Publications

Print and online publications, web pages, and online databases serve as mechanisms for CIP's information dissemination. CIP publishes books, manuals, reports, working papers, and training materials. To improve implementation and decision-making in the use of new technologies, CIP develops and disseminates models, software, and other research tools.

The library at CIP provides information services to researchers and others involved in the improvement of commodity production worldwide. The collection is routinely supplemented through user-generated demand and by library staff as they systematically browse pertinent information sources, such as abstracts, journals, table of contents journals, and publisher’s catalogs. All holdings conform to the CIP library database which contains more than 50,000 records, and it is updated daily (CIP, 2005f).

4 Conceptual Framework on Poverty

The main aim and challenge of development cooperation has always been the reduction of poverty in the world. However, what exactly is poverty, and how are research and development policy to be designed, to conceptualize and address and last but not least eradicate it? The answers to this question have been abundant and very different in different times. The chapter 4 provides an overview on the dimensions of poverty. It shows the evolution of poverty concepts seeing poverty as a multidimensional phenomenon that is both, transitory and contextual and its consequences for the assessment of poverty (4.1). Furthermore, a short explanation is given on the Livelihood System Approach (LSA), which served as basis for the methodology of the current study (4.2).

4.1 The Dimensions of Poverty

In the 1950's, economic poverty concepts have been the most prevalent. People in developing countries were considered poor, because they only had a small income at their disposal. Therefore priority was put on the necessity to trigger economic growth on a macro-economic level. The central development goal of the 50's and 60's has hence been the raising of gross national income that was supposed to trickle down to all levels of society through not further specified means. Furthermore, in the 60's and 70's the necessity of flanking distributory policies and social security systems was discussed. At the end of the 70's and during the 80's, the concept of basic needs – meaning the satisfaction of essential food, health, and education requirements – gained importance.

Since the middle of the 90's the understanding of poverty has again changed substantially – with profound consequences for development policies. Experiences from the past have shown mainly two things:

- Firstly, there is no automatic trickle down of economic growth to all strata of society and the potential canals of intervention have to be considered carefully.
- Secondly, poverty is a much more complex phenomenon than originally presumed and can therefore be fought neither with mere economic nor with only social means.

Apparently a combination of economic, social, political, and institutional factors has to be linked with each other in order to achieve effective alleviation of poverty. Therefore the struggle against poverty shoves itself in a much more encompassing form in the foreground. Poverty has become more and more understood as a multidimensional phenomenon[4] that is not merely defined by the level of income and the fulfillment of basic needs, but also by security and the possibilities of expressing oneself (empowerment). Hence poverty alleviation accordingly encompasses personal basic freedoms and opening up of chances for the poor in a number of different areas. All of the mentioned dimensions of poverty, economic, human, political, security related and socio-cultural, are strongly interrelated with each other. For instance illness and malnourishment not only are direct manifestations of poverty but also influence the capacity to work and therefore the capacity to gain income and pursue a living. Vice versa under a certain level of income a sufficient nutrition and even more so a basic health care can not be secured. A similar relationship exists between education and income, because education has a positive effect on the pursuit of income. At the same time, though, under a certain income level many families consider the opportunity costs of sending their children to school unbearable (Durth et al., 2002).

4.1.1 Whose Reality Counts?

It is important to note, that historically non-poor professionals have mostly defined poverty. Since what is understood under poverty, is very different in different places and times, poverty concepts are more and more trying to account for endogenous notions of what poverty is instead of imposing concepts from the outside.

A description of the affected people themselves reflects the different forms in which poverty manifests itself (World Bank, 2000a). Accordingly, the World Bank's World Development Report 2000 / 2001 stresses the necessity of a more encompassing approach to better characterize poverty, understand its causes and thereby find better solutions to the problem. At the same time, the relevance of a multidimensional concept to better account for the causal inter-linkages and mutual reinforcements of the different components of poverty is highlighted (World Bank, 2000b:15).

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[4] See e.g., Jazairy et al., 1992, UNDP 1990; confirmed for example in the Copenhagen declaration, WSSD, 1995.

In the poverty guidelines agreed on by the donor community's meeting in spring 2001, facilitated by the Development Assistance Committee (DAC), poverty is described as a lack of essential economic, human, political, security related and socio-cultural capabilities (OECD / DAC, 2001: 31f.).

Comparing this understanding of poverty with the definition of development coined by Amartya Sen ("[…] expanding the capabilities of people […] that is, the substantive freedoms he or she enjoys leading the kind of life he or she values", Sen 1983: 755) the tight relation of both concepts becomes apparent. Whereas in former times development was considered the precondition for poverty eradication, today the overcoming of poverty, understood as a lack of essential capabilities, chances and freedoms appears to be a necessary condition for development.

Apart from the different dimensions of poverty the struggle against poverty is strongly related to other development goals. Especially the protection of the environment and resource management are crucial to poverty alleviation because without consideration of these a sustainable reduction of poverty is usually not attainable. It is mostly the very poor, most of which make a living from agriculture, who are most afflicted by natural catastrophes like droughts, floods, hail storms and the like. They are the first who lose the basis of their livelihoods because of deforestation, overuse of pastures, desertification etc. At the same time they are often forced to contribute to the deterioration of their environment in order to be able to make a living. This points to the crucial role of agriculture and agricultural research for poverty alleviation (Box 4.1)

Likewise the role of women is crucial in the development process and in the fight against poverty. Several recent studies show the importance of especially the education of women for the health and nutrition of the whole family, the education of children and family planning (e.g. Michaelowa, 2001:134). At the same time women are often more afflicted by the different forms of poverty than men (Durth et al., 2002).

Responding to such concerns, governments and international development agencies as well as CIP have begun to reexamine their strategies. In September 2000, 189 countries signed the Millennium Declaration, which led to the adoption of the MDGs.

The MDGs are a set of eight goals for which 18 numerical targets have been set and over 40 quantifiable indicators have been identified. The goals are:

- Eradicate extreme poverty and hunger,
- Achieve universal primary education,
- Promote gender equality and empower women,
- Reduce child mortality,
- Improve maternal health,
- Combat HIV / AIDS, malaria, and other diseases,
- Ensure environmental sustainability,
- Develop a global partnership for development.

While each goal is important in its own right, they should be viewed together as they are mutually reinforcing. Achieving them will require building capacity for effective, democratic, and responsible governance, protection of human rights, and respect for the rule of law.[5]

Box 4.1: The role of agriculture for poverty reduction

- "It is central to the livelihoods of the rural poor who, in spite of rapid urbanization, still account for the majority (around 70 per cent) of the world's poor.
- It is the economic heart of most countries and the most likely source of significant economic growth. The fastest rates of economic growth have occurred where agricultural productivity has raised the most – the reverse is also true.
- Growth in agriculture benefits the poor most. Recent research shows that a one per cent increase in agricultural yields reduces the percentage of people living on less than US$1 per day by between 0.6 and 1.2 percent. No other economic activity generates the same benefits for the poor (Irz et al, 2001).
- By providing affordable food, it ensures benefits to the poor beyond the countryside. While hunger and food insecurity have many causes – often outside agriculture – it remains a vital contributor to national and household food security.
- Finally, broad based economic development requires prior growth and productivity gains in agriculture. Few countries have developed diversified economies without first achieving growth in agriculture. But as countries become richer, agriculture will inevitably play a relatively less significant part in the economy and people's livelihoods – this is not a sign of agriculture failing."

Source: DFID, 2003:1

[5]For more details on the MDGs see the Millennium Development Goals website http://ddpext.worldbank.org/ext/MDG/home.do.

4.1.2 The Assessment of Poverty

A common method used to measure poverty is based on income or consumption levels. Even though a relatively high national average income does not guarantee basic nutrition, health, hygiene and education and even less guarantees the acknowledgement of basic human rights and dignity, such a minimum income does secure the possibility of financing the satisfaction of some of these needs. A person is considered poor if his or her consumption or income level falls below some minimum level necessary to meet basic needs (absolute poverty). This minimum level is usually called the "poverty line". What is necessary to satisfy basic needs varies across time and societies, though (relative poverty). Therefore, each country uses lines that are appropriate to its level of development, societal norms and values. When estimating poverty worldwide, the same reference poverty line has to be used, and expressed in a common unit across countries. Therefore, for the purpose of global aggregation and comparison, the World Bank uses reference lines set at US$ 1 (extreme poverty) and US$ 2 (poverty) per day[6] (World Bank, 2005).[7]

Since poverty is increasingly understood as a multi-dimensional phenomenon, measures that only reflect a single aspect of poverty such as income or expenditure have come to be seen as inadequate. Also, there is an emerging recognition that poverty should be perceived not only as a state of deprivation but also as a set of processes that lead to and intensify the state of deprivation. This calls for poverty measures that reflect the dynamic aspects of poverty and the relations that exist between the poor and non-poor. Moreover, the manifestations of poverty as well as the causes and processes leading to poverty are contextual. Poverty measures should therefore also be able to accommodate such contextuality. The more encompassing definition of poverty developed in recent years, ac-counts more for the complexity of the phenomenon, but at the same time makes it more difficult to assess it with statistical indicators. Especially for the security related, political and socio-cultural aspects commonly agreed upon indicators are still lacking. These dimensions are difficult to assess quantitatively and are preferably described qualitatively.

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[6] More precisely US $ 1.08 and US $ 2.15 in 1993 Purchasing Power Parity terms.

[7] This method requires detailed information on household incomes and expenditures, commodity prices, and a number of other economic indicators.

To depict poverty as a whole, through a single indicator, is accordingly even more impossible. Still there have been attempts in recent years at least to depict some of its components at once. The most well known indicators of this kind are the Human Development Index (HDI) – introduced in the Human Development Report 1990 – and the Human Poverty Index (HPI) – introduced 1997 – that are both annually published by the UNDP. Both indices focus on three measurable dimensions of human development: living a long and healthy life, being educated, and having a decent standard of living. Thus, they combine measures of life expectancy, school enrolment, literacy, and income to allow a broader view of a country's development than does income alone. Only the partial indicators used for the different areas of examination differ. While the HDI measures average achievement and the overall progress of a country in human development, the HPI–1 measures human poverty in developing countries. It focuses on the proportion of people below a threshold level in basic dimensions of human development much as the poverty headcount measures the proportion of people below a certain income level. The HPI-1 doesn't include any measures of income at all but assesses the living standard only by measures of nutrition and health. Furthermore, the HPI in opposite to the HDI avoids the inclusion of average values, in which the very low figures for certain parts of populations are leveled out by the high ones of other groups. Therefore, for instance, the life expectancy in the HPI is defined as the percentage of the population that can not expect to reach a certain minimum age[8].

The *Fondo Nacional de Compensación y Desarollo Social* (FONCODES[9]) in Peru has also developed an indicator for poverty, which similarly comprises nutrition (percentage of children with chronic malnutrition), education (illiteracy rate and rate of non-attendance in schools), and living standard (rate of precarious / crowded housing and rate of lacking access to basic services) in equal balance (FONCODES 2000). These indicators coincide with the poverty indicators used by the Ministry of Economics and Finances (MAF).

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[8] For more specific information on the construction of both these indicators see UNDP, 2000:269;272). For the HDI / HPI-1 values of the study region see 6.3.

[9] FONCODES is the executing agency of the poverty reduction program of the Peruvian government, which started in 1991. It is attached to the Ministry for Women and Social Development (MIMDES) and subordinated to the Presidential Office. For further information on the construction of the poverty index see FONCODES, 2000.

CIP selected the villages, in which this study was conducted, on the basis of the FONCODES poverty map and other criteria (7.1).

Measuring poverty is often treated as a purely technical issue. Discussions on how to measure poverty tend to deal with determining country-specific poverty lines, the cost of a basic goods basket, etc. However, there are reasons for not shying away from the issue of poverty measurements as an altogether “technical" issue of “getting the poverty line right”.

First, poverty measures heavily influence our understanding of poverty. As expressed by Chambers: "[…] Deprivation and poverty come to be seen as what is measured and shown in statistics. Deprivation and poverty are then defined, not by the changing and varied wants and needs of the poor, but by the more static and standardized wants and needs of professionals. Analysts' needs for numbers narrow their perceptions. Conceptually, professionals are caught in their own poverty trap” (Chambers, 1989:6).

Second and related, poverty measures play a crucial role in the identification and design of interventions intended to reduce poverty. They encourage interventions to be designed so that their impact can be measured and recognized, e.g. as an increase in the proportion of a population having an annual income above a certain "poverty level", while causing other – and non-measured – dimensions to be neglected, such as the seasonal variation in income. Imperfect poverty measures therefore tend to lead to poorly designed interventions.

Third and finally, poverty measures serve important evaluative purposes (Ravallion, 1992). Poverty measures are needed to allow a comparison of which of two situations has more poverty, e.g. before and after a given intervention, or between two countries that have pursued different policies or are competing as candidates for donor support. Such analysis formed the basis for the World Bank's strategy for poverty reduction (World Bank 1990, 1992). In this context it is important to differentiate between chronic and transitory poverty. Even though panel data sets are available for only a few developing countries first empirical evidence seems to bring to light the high prevalence of transitory poverty. On the one hand this implies that poverty is reversible, on the other hand it means that a great number of people is under unfavorable conditions prone to slide below the poverty line.

Designing meaningful poverty measures with the participation of the people concerned is therefore a matter of giving reflection to poverty as a human predicament experienced by millions of people throughout the world as a means to improve interventions to reduce poverty rather than just a "technical" matter of "getting the poverty line right". "Relatively little overlap exists between categories of the poor identified using self-perceptions and monetary measures […]. For a number of reasons, while examining household dynamics, it is preferable to work with people's own definitions. Households' strategies for dealing with poverty are hard to discern otherwise" (Krishna et al., 2005).

4.2 The Livelihood System Approach

4.2.1 The Livelihood System Approach Framework

After discussing the concepts and indicators of poverty, the question arises how to assess poverty as a multidimensional, dynamic and contextual phenomenon on household and village level, how to make the voices of the poor be heard, to understand what they actually aspire to and what keeps them from attaining it. The goal of people's aspirations is the opposite of poverty, which is defined as well-being in the current study. To assess what people do in order to achieve well-being, what strategies they pursue and what outcomes they attain, the livelihood system approach (LSA) has been employed for this study, which seems to be especially relevant for interdisciplinary agricultural research. The LSA Framework is a way of thinking about the objectives, scope and priorities of development and is promoted by the British government's Department for International Development (DFID). The approach is a combination of various concepts in participatory research and draws on the work of the Institute of Development Studies (IDS). The framework of the LSA is instrumental in understanding the mechanisms of livelihoods that determine household food and nutrition security (Box 2.1), one of the most vital outcomes of a household's livelihood system. The LSA formed the basis for empirical research studies (e.g. SLE / CATAD, 2001), and, at the same time, it has been proposed as a useful tool for planning and monitoring village development.

The six core principles of the LSA promoted by DFID (DFID, 2000) are:

- **People-centered**: Participation of target groups in development is to be promoted, viz. through participatory needs assessment (PNA) and community mobilization. It is crucial not to assume homogeneity in populations and to identify vulnerable groups for specific support.
- **Holistic**: The LSA provides a way of thinking that is non-sectoral, it recognizes the multi-dimensionality of village life, the multiple influences on people and the multiple actors and institutions involved in development.
- **Building on strengths**: The LSA focuses on an analysis of strength rather than needs. People are not seen as helpless victims but as conscious actors with strategies to cope with or adapt to dynamic environments.
- **Dynamic**: Livelihoods and the institutions shaping them are highly dynamic. This is particularly true of complex emergencies, which impose external shocks to the livelihood systems. A key question is how livelihoods are able to recover from these shocks.
- **Macro-micro links**: Macro-policies and interventions have a profound impact at the micro-level. Feeding micro-level information to decision-makers at macro-level is therefore essential.
- **Sustainability**: The term sustainability covers two main aspects: First it looks at the sustainability of the livelihood system: have local assets and resources depleted or are they accumulated over time? Similarly, institutional sustainability means that institutional arrangements conducive for development are able to deliver adequate services in a long-term perspective.

Four questions need to be clarified:

- What is livelihood?
- When are livelihoods sustainable?
- What is the relationship of livelihood to households?
- How do we interpret a complex livelihood environment?

Chambers and Conway (1992:9) give the following definition for livelihood: “Livelihood refers to the means of gaining a living, including livelihood capabilities, tangible assets, and intangible assets”.

Carney, building on the work of Chambers and others from the Institute of Development Studies of the University of Sussex, came up with a similar definition of livelihood and tied it more explicitly to the notion of sustainability. The emerging framework came to be known as the Sustainable Livelihoods Framework (SL): “A livelihood comprises the capabilities, assets (including both material and social resources) and activities required for a means of living. A livelihood is sustainable when it can cope with and recover from stresses and

shocks and maintain or enhance its capabilities and assets both now and in the future, while not undermining the natural resource base" (Carney 1998, modified after Chambers & Conway, 1992).

Taken together, these definitions reveal that livelihood is a multi-facetted concept, being both what people do and what they accomplish by doing it, referring to outcomes as well as activities[10]. Figure 4.1 graphically depicts the SL framework.

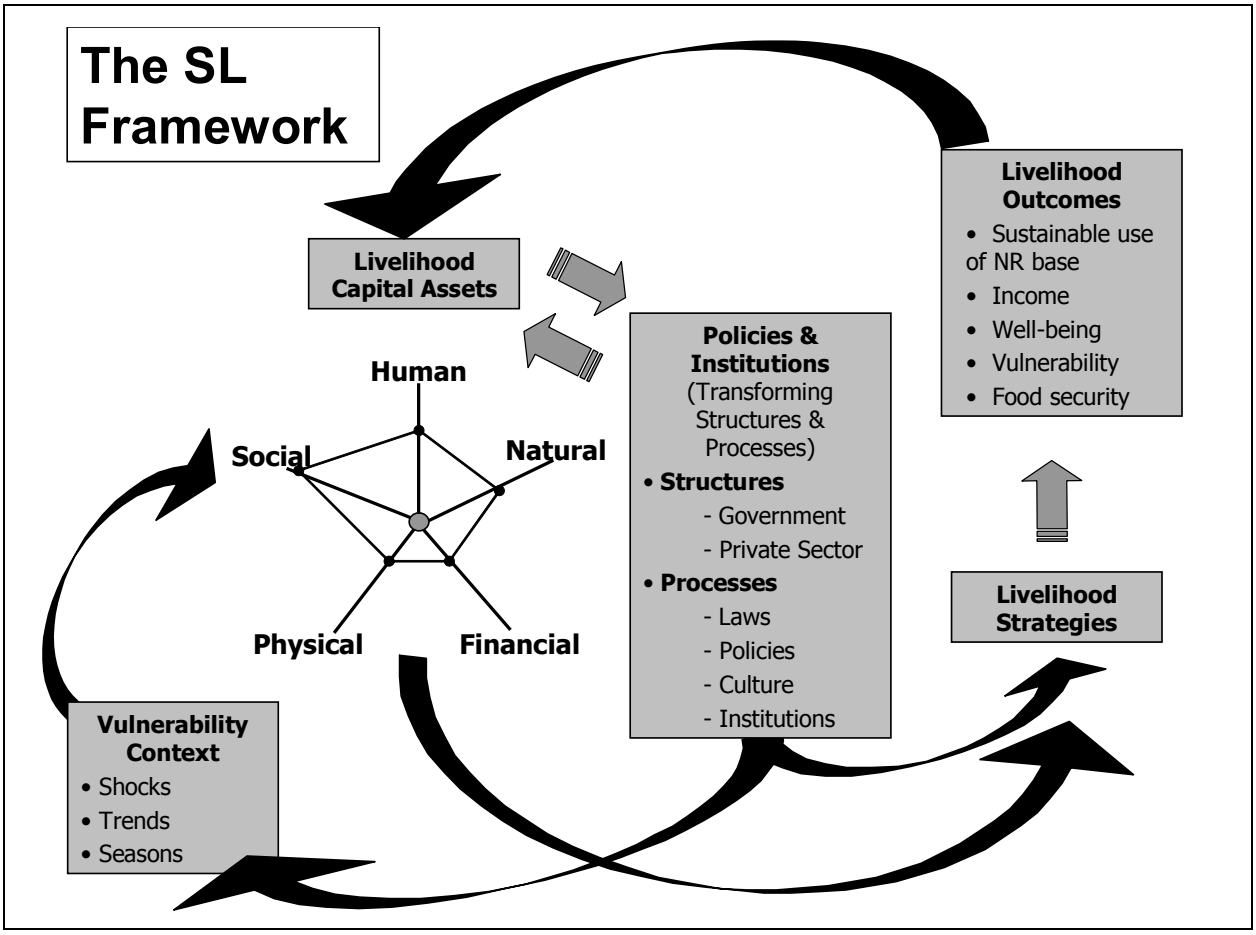

Figure 4.1: The Sustainable Livelihood Systems Framework (DFID, 2005)

The vulnerability context provides the background for households to secure their livelihoods (Box 4.2). The livelihood approach looks into the household's resources, classified according to the five capital assets (Box 4.3) and attempts to trace how people combine their assets to livelihood strategies (4.2.2) in order to attain certain livelihood outcomes.

[10] For detailed discussion see Scoones (1998); Carney (1998) Chambers and Conway (1992).

Apart from the vulnerability context, transforming structures and processes will influence and shape behavioral patterns of people. What structures (institutions, organizations, laws, and policies) are present in the livelihood context and how do these structures perform and act (processes)? Processes would thus refer to the actual institutional arrangements (rules of the game, (dis-) incentives).

Box 4.2: Vulnerability Context

- **Trends:**

Resource stocks: What happens to natural resource stocks and their quality (degradation, renewal, loss)?

Population density: What is the current density and how does it change?

Technology: What technologies exist which are of likely benefit to the people in the area?

Politics: How are people in the area placed in terms of political representation?

Economics: How do economic trends affect livelihoods (global prices, open economy, labor markets, taxes etc.)?

- **Shocks:**

Climate: How does the climate affect people's well-being (droughts, natural disasters)?

Conflict: How do conflicts over resources affect livelihoods and how likely is an escalation of violence?

- **Culture:**

What effect does culture have, if any, on the way people manage their assets and the livelihood choices they make?

Source: Adapted from Carney (1998)

Structures and processes are critical in determining who gains access to which assets and to define the actual value of certain assets. Markets and legal restrictions have a profound influence on the extent to which one capital asset can be converted into other types of capital assets. A range of factors combines to impede the realization of the rights of the poor. Too often, there is discrimination in law, regulation, and custom that excludes the poorest from markets, from financial services, from land, and from technical information. Public services are often ineffective and there are insufficient incentives for the private sector to service poor people's needs. The rules for international trade in agricultural produce remain largely inimical to the interests of developing countries. Subsidies provided by wealthy countries to their producers result in overproduction and depression of world prices. Along with other trade barriers, this clearly limits opportunity in developing countries.

Livelihood outcomes refer to the state of being the household achieves with its strategies. They include well-being, income, vulnerability, and the sustainability of the livelihood. One of the most vital livelihood outcomes, especially for poor households is food security (Box 4.4). However, there are often trade-offs between different livelihood outcomes (e.g. between food security and sustainability).

Box 4.3: The Five Capital Assets

- **Human capital:**

Skills, knowledge and information, ability to labor and good health needed to pursue different livelihood strategies.

- **Natural capital:**

The natural resource stock from which resource flows useful for livelihoods are derived (e.g. land, water, wildlife, biodiversity, etc.).

- **Financial capital:**

The financial resources available to people (savings, access to credit, remittances or pensions) which provide them with different livelihood options.

- **Physical capital:**

The basic infrastructure (transport, shelter, water, energy, and communications) equipment and means, which enable people to pursue their livelihoods.

- **Social capital:**

The social resources (networks, memberships of groups, relationship or trust, access to institutions) upon which people draw in pursuit of livelihoods.

Source: Scoones (1998), adapted[11]

In Figure 4.2 crucial linkages are depicted that relate desired output, namely livelihood security, to the activities and means (inputs and management of resources) of a rural household to achieve it. The box in the center depicts the family-based farming household system consisting of the sub-systems of family, farm, and household (the boxes representing farm and household as entities where activities of livelihood generation take place as well as the activities themselves).

[11] Some authors include other assets, such as political or socio-cultural capital, referring to the capability to influence decision-making for transforming needs into opportunities and the rules of behavior that influence decision-making. These assets are not accounted for in the methodology of this study even though some aspects are reflected in the social capital assessment.

These sub-systems overlap but do not necessarily coincide: non-family might belong to the household and household members might pursue off-farm income outside the community[12]. The livelihood system is embedded in an environmental context as well as interfaces with other systems. For rural livelihoods, the ecological, economic (e.g. markets), and socio-cultural environments are of particular importance.

Box 4.4: The concept of integrated food and nutrition security (FNS)

The concept of **integrated food and nutrition security** (FNS) distinguishes three dimensions of food security:

1. **Availability** of food at all times (is sufficient food locally produced or imported to be available at local markets?)
2. **Access** to food at all times (do households have the purchasing power or other entitlements to buy food?)
3. **Use and utilization** of food according to sufficient dietary standards (do people prepare nutritious food and are they, concerning their state of health, able to absorb it?)

For all these elements, stability over time is a crucial feature as food security can be chronic or transitory.

Source: Klennert (ed.), 2005

The household as the level of analysis occupies a central place in the diagram. Householding (as coined by Polanyi, 1997:41) or household production can be seen as a bundle of activities, directed at satisfying the material needs of the household members and at creating the conditions for the satisfaction of non-material needs (Hardon-Baars, 1994).

[12] Still, for the purpose of the current study, the terms household and family will be used synonymously.

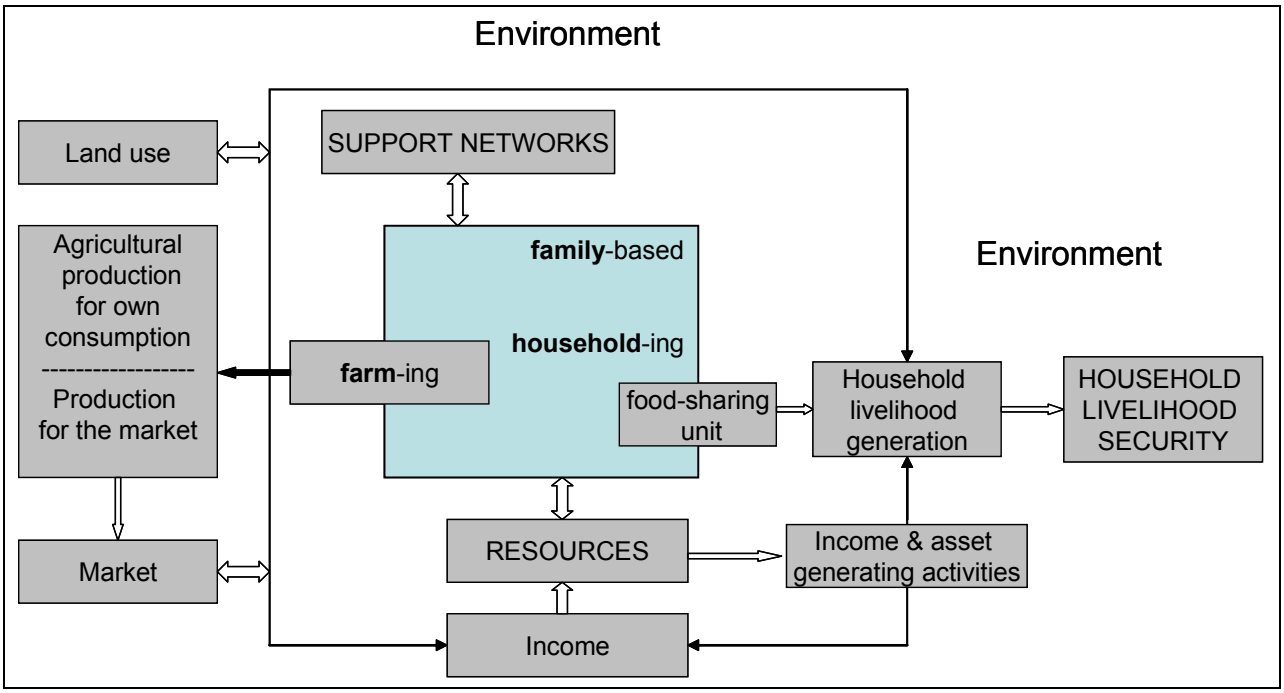

Figure 4.2: The Livelihood System in rural households (Adapted from Niehof and Price, 2001:9)

4.2.2 Livelihood Strategies: Coping or Adapting?

People must combine different capital assets they have access to or control of (capital asset endowment) in order to attain livelihoods and outcomes, i.e. develop certain livelihood strategies. Livelihood strategies will differ with regard to whether people have to deal with gradual trends or sudden shocks:

- Adaptive strategies denote changes that are more or less conscious and deliberate in the way people adjust livelihood strategies to long term changes and challenges (trends).
- Coping strategies are short-term responses to periodic stress or sudden shocks to both natural and political hazards (Rennie and Singh, 1996).

In complex emergencies, there is an overlap of adaptive and coping strategies. However, due to the high incidence of sudden shocks, it is coping strategies that determine the daily survival of people to a great extent. In many cases, coping strategies with a focus on short term survival might not be sustainable in the long term. However, over time, coping strategies may evolve into adaptive strategies. Having coping strategies may thus actually be a precondition for adaptive strategies to work.

Scoones (1998:9) distinguishes three core **livelihood strategies:**

- Agricultural intensification or extensification, which can be either capital or labor-based.
- Livelihood diversification (Ellis, 1998, Hussein and Nelson, 1998) – either the choice of investing in diversified accumulation and reinvestment, or developing livelihood portfolios to cover all types of stresses and shocks.
- Migration – either voluntary (labor migration) or forced (displacement), either temporary or permanent.

The stock of possible combinations of activities can be understood as a livelihood portfolio, which might be limited to a few activities or highly diversified (Scoones, 1998). The diversity of a livelihood portfolio depends on both capital assets and endowments, and external factors (structures and processes and the vulnerability context), which determine the livelihood choices.

5 Methodology

The methodology is formed by a set of different methods which were applied on different administrational levels to achieve the results of the current study (5.1). As elaborated in chapter 4 the goal of people's livelihoods and the goal of development (aid) is well-being. What is well-being for the people concerned, though? What is it that the poor aspire to, what helps them get there, and what keeps them from attaining it? To assess the answers to these questions a Participatory Approach to Poverty Assessment (PAPA) was developed (5.2 and 5.3). A short documentation of the lessons learned is supposed to be useful for further development and adaptation of PAPA for similar studies (5.4).

5.1 Set of Methods

A set of different methods (Figure 5.1) has been applied on different administrational levels in order to answer the research questions of this study.

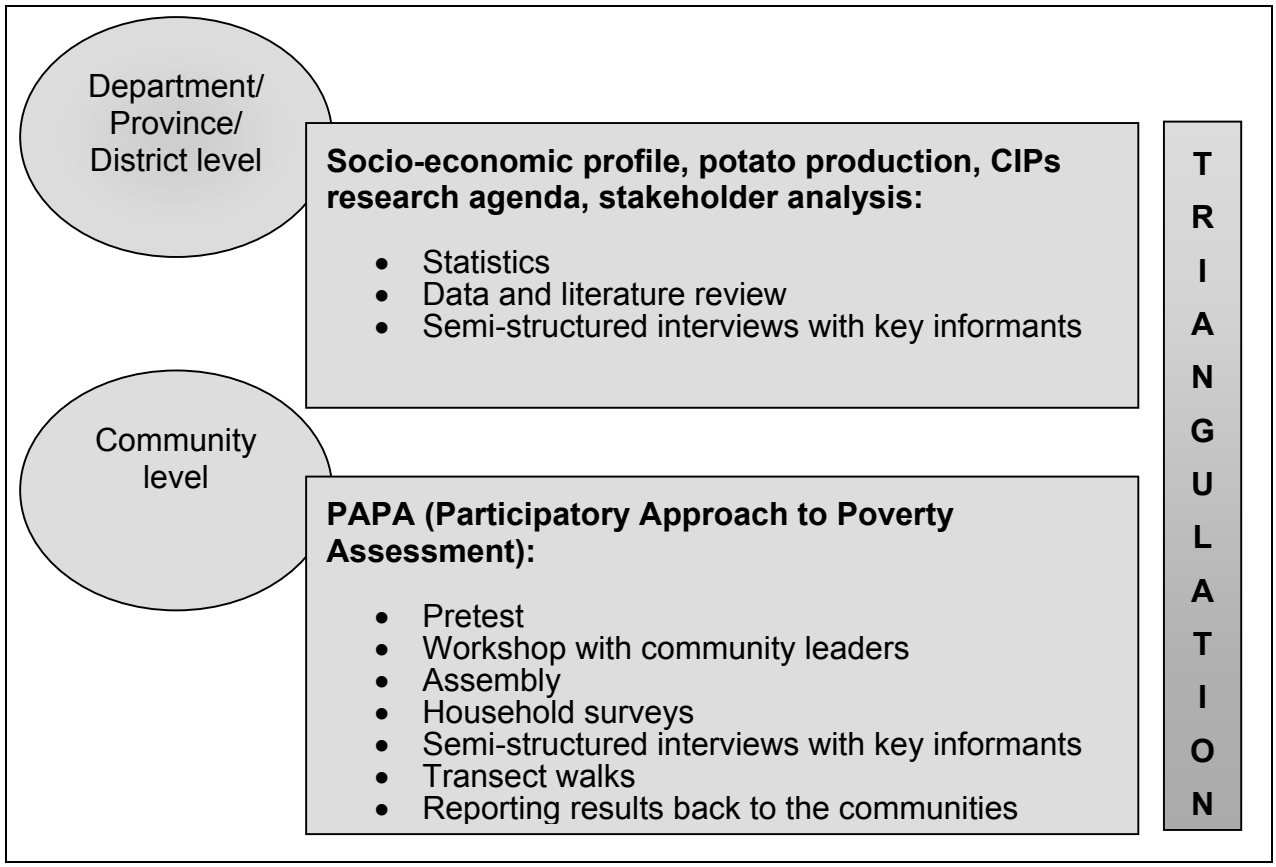

Figure 5.1: Set of methods applied on different administrational levels

For the socio-economic description of the study region mainly secondary data was analyzed through literature research and by semi-structured interviews with key informants from several institutions such as the Ministry of Agriculture (MINAG), the National and Regional Statistic Institute (INEI), the National Institute for Agricultural Research and Extension (INIEA) and CIP as well as with other main stakeholders working in the field of potato production in the Mantaro Valley. In order to get to know CIP's research agenda a checklist for semi-structured interviews was developed and implemented with the division leaders of CIP and other CIP key informants.

5.2 The Participatory Approach to Poverty Assessment (PAPA)

To understand the perception of poverty of the people living in the participating communities, PAPA was developed. PAPA is a multidimensional approach on poverty, which combines different instruments in a logic sequence. PAPA was developed as result of stimulation by the following approaches: the Stages of Progress-Approach (Krishna, 2004a; Krishna, 2004b; Krishna, Kristjanson, Kuan, et al. 2005), MAPP (Method for Impact Assessment of Programs and Projects) (Neubert, 2004), and PRA (Participatory Rural Appraisal)-Instruments (e.g. Chambers, 1983). The approach was developed following an iterative process. Several meetings to discuss the approach were conducted with CIP personnel and experienced Peruvian facilitators.

PAPA is characterized by its openness, not suggesting any criteria or definition of poverty. PAPA enables to capture the people's perception of well-being and to go beyond a mere material dimension of poverty. PAPA allows, besides gathering information about the material status, for instance also an insight into the importance of social organization for communities. PAPA serves to capture collective notions of what well-being means (and thus as well what it means to be poor) for a household of the community. By taking the concept of dynamics developed for the Stages-of-Progress Approach (Krishna, 2005), it allows the explanation of movements between different categories of well-being.

The core of PAPA consists of a workshop with community leaders, a community assembly, and a follow up household survey. For triangulation and additional data collection on community level, semi-structured interviews with key informants, such as the local leaders, the health care staff and employees from

the organizations, which are working in the communities, were conducted. Transect walks served to complete the given information on communal level. Peruvian facilitators and interviewers supported the SLE team in gathering the information at community level (Annex II). The team collected the data from August 22 to September 1, 2005. Data processing took place simultaneously and continued until September 10, 2005.

5.3 The Elements of PAPA

5.3.1 Contacting the Communities

CIP selected the four communities that participated in the study according to poverty criteria and other aspects (7.1). When the communities were selected, CIP sent them an introductory letter explaining the purpose of the investigation, requesting their participation in the study, and informing them that the SLE group would contact them again within six weeks.

The SLE group visited the communities in order to introduce themselves, explain once more the objective of the study, get to know the local conditions and invite the local authorities to the workshop in Huancayo. On this occasion, forms to register the families living in the communities (Annex III) were distributed, to be filled in and to be brought to the workshop. The community lists also included a classification in terms of farm types to be filled in by the authorities (6.4).

5.3.2 Pre-test

The approach was tested in a different community prior to its implementation. During the test, the vocabulary to be used was crosschecked to obtain an understanding of the meanings and connotations of key words such as "well-being" in the local context. The test application of the questionnaire for the household survey helped to close open questions and also to find further categories of answers for some questions.

5.3.3 Workshop with the Community Leaders

The objective of the workshop, held at the CIP research station in Huancayo, with three to four local authorities from all participating communities, was to obtain detailed information on community level, to inform the local leaders about the study and to coordinate the logistical preparation of the assembly.

To investigate about the dynamics of potato production in the communities "life lines", as developed in MAPP, were drawn. PRA-Methods were used to further investigate about patterns of agricultural production and access to resources and services (Annex VII).

5.3.4 Communal Assembly[13]

The presidents of the communities summoned the community members to the assemblies. Special attention was given to invite representatives of all families, especially women, elderly people, and members of poorest families as well as non- (active) community members. The common lunch with traditional food[14], to which both parts contributed, served as an additional incentive.

Step 1: Presentation of the team and the objective of the study

The team was introduced to the assembly as a group of students from the Humboldt University in Berlin, Germany, conducting a study on potato producing communities in the region. It was important to explain that the intention was to learn from the experiences of the farmers in potato production and that neither a project nor other benefits would result from their participation in the assembly and in the household survey. It was explained that the objective of the assembly was to learn how the living conditions of the farmers had changed during the last 15 years, using as point of reference the end of the government of ex-Peruvian President Alan Garcia in 1990.

Step 2: Identifying criteria for well-being

To find out how people living in the participating communities distinguish between different groups of well-being, the local population brainstormed together on the criteria for well being. In order not to suggest any criteria, but to capture the perception of the assembled community members, an open question was asked to the assembly: "What does well-being for a household in your community mean?"

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[13] The steps 4, 7 and 9 are correspondent to the Stages-of-Progress Approach developed by Dr. A. Krishna from Duke University, which was made available to the group by Ms. J. Kuan in Peru.

[14] The traditional food of the Peruvian Highland is *Pachamanca.* It is a meat and potato feast and is cooked in an "oven" of rocks or in a hole in the earth in the countryside. It is a traditional Andean meal, which also consists of other roots and tubers, as well as beans sometimes.

Step 3: Ranking the criteria

The mentioned criteria of well-being were put into a sequence to show an importance ranking as defined by the local population. In order to do so, the assembly was asked to imagine a household in a very bad situation: “Which of your criteria of well-being would be the most important to achieve first for this household?”

This was followed by the question: “The household has achieved this criterion now, which one would be the next important?”

This process continued until all criteria had been put into an order according to importance. The ranking was achieved through lively discussions among the community members until a consensus was reached. During this process, the assembled community members mentioned additional criteria completing the ranking. Hence, a pathway out of poverty was constructed. Since PAPA is not based on expenditure but on endogenous criteria of well-being, it transcends the material dimension of poverty and includes non tangible assets such as social exclusion.

Step 4: Drawing the poverty line

In order to distinguish between the poor and non-poor, a commonly agreed poverty line, as perceived by the local population, was drawn. The villagers were asked: “Above which level of the ranking a household is no longer considered to be poor in your community?”

Having the villagers draw their own poverty line enabled them to define two groups characterized by different attributes: The ones who were considered to be poor and the ones who were considered to be non-poor. It is crucial that until this point the facilitators had not used the words "poor" or "non-poor". These words were introduced at this stage for the first time.

Step 5: Further characterization of the criteria of well-being

After having drawn the poverty line the assembly was asked to give a further characterization of the groups, to gain a better understanding of what being poor – and respectively being non-poor – actually means to a family in the community. This was achieved by asking the assembly to specify the ranked criteria in detail. What does it mean for a family in this community to be poor or non-poor?, e.g.:

- “How do the clothes of a “poor” family look like?”
- “How does the house of a “poor” family look like?”
- “To what type of medical health service has a “poor” household access?”
- “What type of education do the children of “non-poor” households receive?”

The facilitators reminded the community members during this process to refer to families living in the respective community.

Step 6: Identifying the households' status for the present and 15 years ago

To inquire about households’ status of well-being in the community in the present and 15 years ago, every household had to be assigned to the group “poor” or “non-poor” for the present and 15 years ago. The previously defined perception of poverty of the community members served as the reference point for this classification. There was no inquiry about possible differences of the perception of well-being 15 years ago.

For this step, the list of households previously prepared by the community leaders was used. In accordance to the shared understanding of poverty developed in the previous step, the assembly participants identified each household’s status. Thus the approach offered the people in the communities the possibility to determine themselves, in accordance with their own perception of well-being, who was poor or non-poor, estimating which assets the family concerned possessed or what outcomes they had achieved. Accordingly, the household was being classified as below the poverty line (poor) or above the poverty line (non-poor) at the current time as well as 15 years ago.

Households that exist today formed the units of analysis, and asking about poverty 15 years ago was done in reference to the same households. The majority of present-day households, particularly those headed by older villagers, existed 15 years ago, whereas presently younger households did not exist at that time. In these cases, the poverty status of their parents’ or guardians’ households was inquired.

Step 7: Dynamics of poverty: Subdivision of the households in four categories of well-being

In order to find out about the poverty dynamics of each household, its status in the beginning and end of the considered time frame of 15 years had to be compared.

In accordance with the Stages of Progress-Methodology (Krishna, 2005), the analysis provided four different categories of households in the communities:

- **Remained Poor (RP)**: Poor fifteen years ago and poor now
- **Escaped Poverty (EP)**: Poor fifteen years ago and non-poor now
- **Became Poor (BP)**: Non-poor fifteen years ago and poor now
- **Remained Non-poor (RNP)**: Non-poor fifteen years ago and non-poor now.

Step 8: Drawing of the sample

In order to understand the poverty dynamics in the community, a sample was drawn by randomly selecting households to be interviewed. In case of having only few families in one or several of the categories, it was tried to survey all the households in these groups. The size of the sample strongly depends on the resources (time, money and staff) available. For the current study, a percentage of at least 40 % of the households in each of the categories was sampled.

Step 9: Identification of the reasons for the dynamics

The assembly was asked to provide reasons for the movements into and out of poverty for each of the selected households. The analysis of each household's movements done by the community members explains – triangulated by the household survey – which factors contributed to a household remaining poor, escaping poverty, becoming poor, or remaining non-poor during the last 15 years.

5.3.5 Household Survey

Representatives of each household in the sample were interviewed after the assembly or in the following days to get a further insight into the causes of poverty (Annex IV). The household survey served to verify and triangulate the poverty analysis of the households provided by the assembly, as well as to get a deeper insight into the household's development. The survey captured information about the assets available to the households, as well as the individual coping and adaptation strategies (4.2). The questionnaire was developed in an iterative process and reviewed after discussions with CIP researchers and the test application in one community. The average interview time was 90 minutes.

5.3.6 Reporting Results Back to the Communities

Two weeks after finishing the field work, the SLE group returned to the communities to provide information about the results of the assembly. Each community received a leaflet with the most important results, as well as large charts with a gallery of photographs that had been taken during the assembly (Annex V) and a documentation CD with the leaflet and all photographs taken in the community.[15] Those leaflets were designed to serve as a kind of information to visitors or visiting organizations.

5.3.7 Data Analysis

The data analysis of the household surveys was done with the help of SPSS. Mainly frequencies and cross tabs were produced. To account for the farmers' own perception of poverty the information provided by the assemblies was used to derive hypothesis on poverty, which was crosschecked by the results of the household survey. Information gained through interviews and transect walks served to triangulate or complement data qualitatively.

5.4 Lessons Learned

5.4.1 Communication and Intercultural Aspects

The cooperation in the intercultural team of Peruvians and Germans functioned very well. The assumption that Germans could have difficulties in gaining the confidence of the farmers was not confirmed. On the contrary, the farmers were very interested in sharing experiences with the foreigners and asked many questions about the living situation and potato production in Germany. It was very important to explain to the farmers in the communities that the purpose of the assembly was not only to learn from them, but also to provide an exchange of information by presenting some facts about potato production in Germany. This exchange of information raised interest and established confidence through the whole process.

[15] Community members stated that they had access to computers to look at the CD in the many Internet cafes in the nearest town.

PAPA can also serve as a tool of self evaluation or project planning and empowerment for communities. Many comments were made by the farmers, expressing their satisfaction of having defined their own concept of well-being and having reflected the development of the households' status in the last 15 years.

During the assembly, female members of the investigation team sat close to the female community members in order to ask them about their opinions and to make their voices heard.

5.4.2 Training of Staff and Aspects of Data Collection

PAPA – as well as other approaches, which include conducting community assemblies – is very demanding on the role of the facilitators. The facilitators require special skills to keep community participation at high levels during the whole day. For the current study, the facilitators had those skills. The facilitators were trained one week prior to the investigation. Some had previously been trained in the similar Stages-of-Progress methodology. On the one hand they contributed to the whole process with their experience; on the other hand, special care had to be taken, to not allow the confusion of the two approaches during field work.

The communities provided their own concept of poverty by referring to families in their own community. It is important to keep in mind that their point of reference for the concept of poverty is their own community and not the living standards of others, like for example those in a nearby city. The formulations of the questions, asked by the facilitators, had to be prepared very carefully in order not to suggest any answers to the peasants.

The training for the household survey was done in two different groups. Survey takers with experience had to be trained in order not to suggest answers to the interviewed family members. Less experienced interviewers had to be advised on how to conduct the household survey, e.g. how to get percentages (for instance with the 10 beans method[16]). The assessment of exact data (absolute numbers) such as cropped area in hectare, or the amount of yields in tons appeared to be difficult.

[16] Ten beans (or fingers, or stones) representing 10 % each.

It seems important to invest as much time as possible in the preparation of the questionnaire and the training of interviewers for the household survey. This process also reduced the time that otherwise would have had to be invested after the interviews.

5.4.3 Logistics

The number of participants in the assemblies varied between 30 in Casabamba and 80 in Huayta Corral. The optimal number of participants seems to be between 30 and 40. In larger assemblies, two working groups were formed for the identification of the groups of well-being (Step 6) and the identification of the reasons for the dynamics (Step 9). For the household surveys, it was important to interview community members who lived far away or were not available on the following days immediately after the assembly.

The maximum size of a community where the method is applicable seems to be approximately 200 households. The larger the community, the more improbable is it that the community members know each other and are able to correctly classify all families of the community. For larger communities the subdivision in several assemblies for example according to neighborhoods could be a solution but would require more facilitators.

One also has to consider that there are more favorable and less favorable times of the year for community activities. During the period of the present study, the farmers had recently harvested and were waiting for the next sowing period. This helped to ensure the participation of the largest possible number of household heads in the assembly.

6 Profile of the Study Region

The study region was defined as the catchment area of the Mantaro River and the surrounding mountains. Chapter 6 gives a broad introduction into the study region. After a short description of the natural conditions (6.1) some special characteristics of peasant communities in the Peruvian highlands are presented (6.2). On department, province and district level information about the degree, dynamics and causes of poverty in the study region is given (6.3). A categorization of small farmers in the study region (6.4) can help to develop aggregated intervention strategies of research institutions and extension services. On department and district level, the most important crops in the study region are presented. The dynamics of potato production are described at department level (6.5). In a final part political and institutional frame conditions as well as the activities of CIP and other research and extension services in the study region are described (6.6).

6.1 Geographic and Natural Characteristics of the Study Region

6.1.1 Location

The Central Andean Highlands extend over 121 million ha from Cajamarca in Northern Peru, through Bolivia into Northern Chile and Northeast Argentina. A total population of 16 million people lives here.

The area generally referred to as the Mantaro Valley is the broad plain between the main cities of Jauja and Huancayo. It excludes the northern Pampa de Junín, the southern canyon as well as the *selva alta* regions (Mayer 1979:14). The study region does not primarily encompass the valley bottom, but rather the arable lands located on the slopes and plains in and around the Mantaro Valley at altitudes up to 4.300 m a.s.l. (Figure 6.1). The communities that participated in the current study are located in the departments of Junín and Huancavelica (Table 7.1).

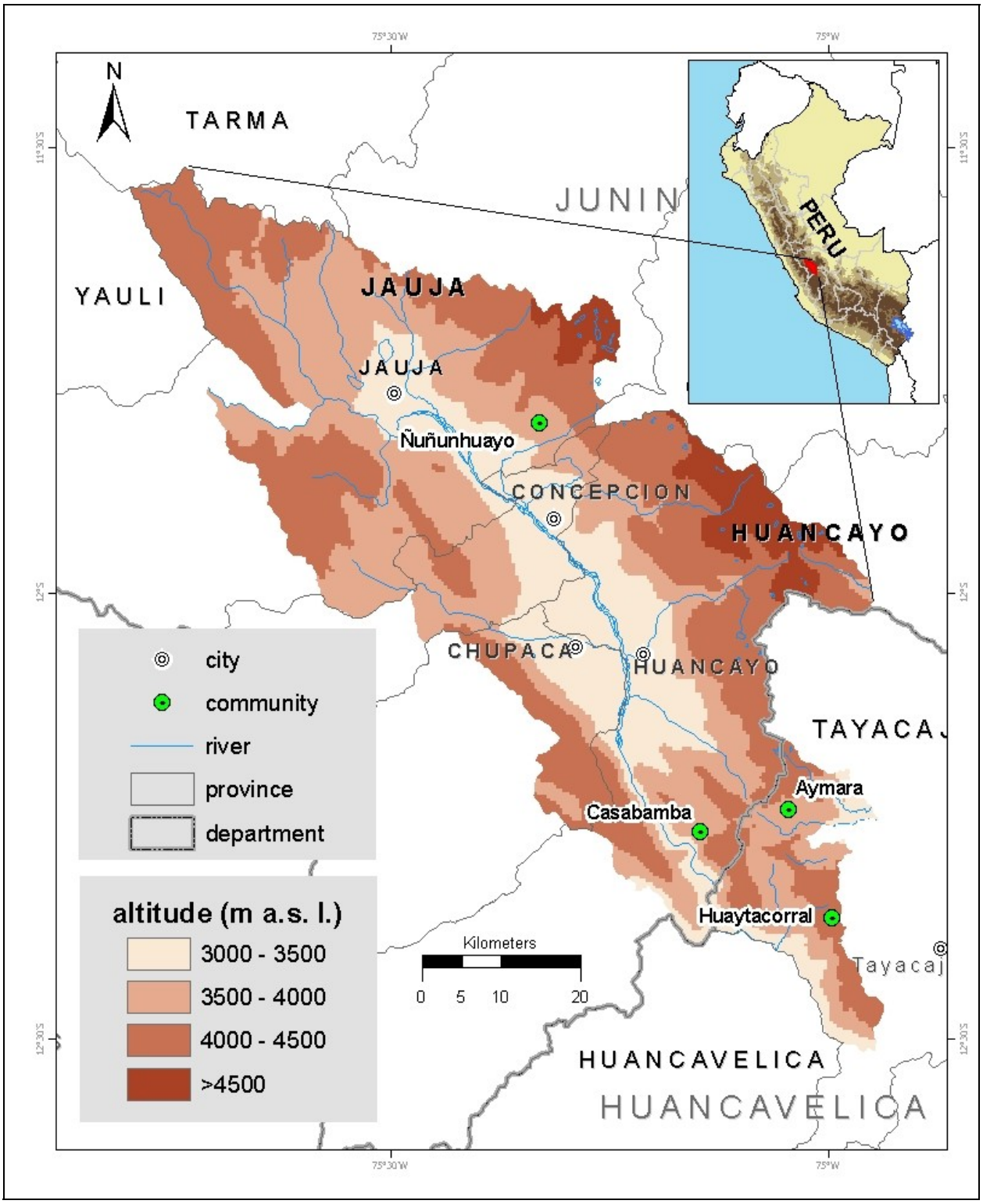

Figure 6.1: Location of the study region – The Mantaro Valley (CIP / SLE, 2005)

6.1.2 Natural Characteristics of the Central Andean Highlands and the Mantaro Valley

The Mantaro Valley is part of the FAO “High Altitude Mixed (Central Andes) Farming System” (FAO, 2001b: 291-298). It is a mostly treeless area of land, which is composed of merely dissected tablelands above the level of 3,000 m and is characterized by interior drainage. Some of the agricultural land reaches up to 4,500 m a.s.l..The climate varies between semiarid to dry-sub-humid. Precipitation is concentrated within a single wet season of variable length and ranges from 150 mm in the western ranges to 1,000 mm per annum in the eastern ranges. Although the soils, and their capability for agricultural production, are extremely diverse, their fertility is normally low. An aridity gradient exists from east to west across the Central Andes as well as from north to south along the length of the mountain chain. Annual mean temperature varies greatly with altitude. Although mainly situated in the tropics, mean daily temperature in this eco-region is generally below 10°C. Especially in the dry season frost is common (FAO, 2001: 291-293).

Average annual precipitations in the Mantaro Valley are around 750 mm. In the last two years negative deviations of 21 % and 30 %, respectively were documented. In non-irrigated zones, this had major implications on agricultural production (MINAG, 2005a). Like the whole tropical Andes region the Mantaro Valley is affected by intensified “El Niño" events with excesses of rain followed by periods of drought (Valdivia and Quiroz, 2003:1). Apart from these, unpredictable extreme weather conditions such as droughts, hail, and frost occur more frequently.

Due to the enormous variety in rock type and genesis and the inclusion of relief, a rich pattern of all types of transition forms of main soil types can be encountered. Presently, there is no detailed data on soils available for the Mantaro Valley[17]. In the National Soil Survey of Peru, valley zones of the Andes of between 2,000 and 4,000 m a.s.l. are referred to the “Región Kastanosolica.” The main soil types of this category are *Kastanozems, Phaeozems, Andosols,* and *Gleysols. Chernozems, Rendzinas,* and *Acrisols* are encountered in areas higher than 4,000 m a.s.l. (Perú Ecológico, 2005).

[17] Currently the Natural Resource Management of CIP is working on a soil map of the Mantaro Valley.

6.1.3 Agro-life Zones of the Mantaro Valley

As throughout the Andes, agriculture in the Mantaro Valley basically depends on the rainfall-frost cycle (Rhoades et al., 1988:37). Depending on altitude levels three major agro-life zones can be distinguished in the Mantaro Valley[18] (Table 6.1).

Table 6.1: Characteristics of agro-life zones in the Mantaro Valley

Agro-life zone	Agro-ecological characteristics
High 3,950 to 4,250 m	Although there is no meteorological data available, in comparison to the intermediate zone higher frost risks and higher annual precipitation can be assumed. Prevalence of small "island-like" cultivated areas, which produce only frost tolerant crops in rotation with ample fallow periods.
Inter-mediate 3,500 to 4,000 m	The complexity of micro-climates is reflected in diversity of agriculture. At the Laive meteorological station (left side of the Mantaro river, 3,900 m a.s.l.) a high risk of frost in critical vegetation periods is apparent. Average annual precipitation is 707 mm. At the right side of the Mantaro river, risks of frost events in critical periods are even higher, while there is less annual precipitation. Cold climate crops, such as tubers, grain, and some legumes are grown, but there is a complete absence of maize. In the crop rotation / fallow cycles of varying patterns can be encountered. Principally, the number of fallow years correlates with altitude as crop ecology and agricultural practices respond to the sloping environmental gradient.
Low 3,000 to 3,500 m	This zone is characterized by a cold and temperate climate, which provides farmers with a greater choice of crops. The risk of frost periods is low. Here maize is present, specialized, irrigated zones exist, and occasionally crop rotations are without fallow.

Source: Mayer, 1979:53; Rhoades et al., 1988:37

[18] The agro-life zone concept is useful to categorize the resource bases of farms in the Mantaro Valley. According to Holdridge (1967) an agro-life zone may be defined, "as an association of cultivated crops in which man-substituted vegetation, domesticated (and wild) animal activities, land physiology, geological formation and soil are all interrelated in a unique and recognizable combination which has a distinct aspect of physiognomy. In addition one must consider human activities, especially those related to land tillage and domesticated animal use, that affect the interaction of the biological species with the physical environment." (Holdridge 1967:35)

The high agro-life zone reaches from 3,950 to 4,250 m, the intermediate from 3,500 to 4,000 m, and the low agro-life zone from 3,000 to 3,500 m a.s.l. (Mayer, 1979: 52). Due to different climatic and soil conditions, some authors further differentiate the intermediate zone in two agro-life zones: the right and left intermediate zone of the Mantaro Valley (Franco & Horton, 1979:35-39). Potato is one of the few crops, which are grown in all agro-life zones of the Mantaro Valley (Box 6.1).

Box 6.1: Origin and diversity of the potato crop

Very few plants – such as potato – can grow in temperatures, which frequently drop below freezing, in areas with high solar radiation and intermittent droughts. For thousands of years Andean people generated a great diversity of native potatoes, obtaining different flavors, shapes and colors. Two lines of evidence indicate potatoes were first cultivated in the central Andes. Archeological remains dating back 4000 to 6000 years ago indicate the potato was first domesticated in the highlands of Bolivia and Peru, quite probably in the *altiplano* surrounding Lake Titicaca. In addition, the richest gene pool of potatoes, estimated by geneticists and taxonomists at CIP to be 4000 to 6000 varieties, is found in the central Andes.

Source: CIP, 2005g and Carney, 1980:3

6.2 Peasant Communities in the Peruvian Highlands

6.2.1 The Household in the Community

The household in the Andean Highlands is the „basic unit that organizes production, distribution, and consumption and ensures its own reproduction" (Mayer, 2002:1) but it does not stand alone, "an understanding of the household economy requires attention both to relationships between households and to those that bind them into a community" as well as commodity markets (ibid:xiii). This social embeddedness of households has major implications for the analysis of poverty as well as for measures to alleviate it. It has to be taken into account, by not only considering the individual household as the object of analysis but also the social system that these individual households are part of.

The household itself is to be seen as a transitory and social construct: "[…] the tendency to establish nuclear families when children marry implied that the household's agricultural enterprise did not persist over time. Rather, households were established at marriage with resources contributed by both spouses and grew as the family developed and children began to contribute, until they in turn married. Then the resources of the group began to be split up among the newly

constituted families. For this reason it is better to consider transmission of landholding through partition rather than inheritance" (Mayer, 2002:7)[19]. This has implications also for the poverty trajectory of a household. Younger households are usually poorer than older households whereas very old households (those that already have adult children) are again poorer and depend on their children's' households.

"The capacity to act collectively is the most outstanding characteristic of Andean households" (Mayer, 2002:35). Far from being ideologically determined, according to Mayer (2002), peasant households band together and cooperate, simply because they have to. Reciprocity between households is an expression of the impossibility to perform all agricultural tasks alone and the need to schedule those tasks, which after institutionalization becomes a social norm. Reciprocity forms in the *comunidades campesinas* include mutual obligations to help in labor like *ayni* (or *minka,* e.g. in *compadrazgos*)[20]. Apparently there is a correlation between wealth and the substitution of reciprocity with wage labor. Communal obligations include work (called *faena or mita*[21] e.g. for road maintenance or to work communal lands for community expenses), cargo-redistribution (e.g. in festivals for catholic saints), taxation or fees and *varayoq / cargo*[22] offices in the civil religious hierarchy, assumed by male household heads on a rotational basis (Mayer, 2002:105ff).

Conflicts within communities take rather place between interest groups and extended families than between individuals (Mayer, 2002:37).

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[19] The new household in the beginning continues to be linked to and dependent on the parents' households. When parents die, their lands have usually already been turned over to their children and those lands that have not yet been turned over, are then designated among the children (ibid.).

[20] Further information on the complex system of mutual obligations in Mayer, 2001, 105ff.

[21] *Faenas* are communal labor parties, *mita* is the historic predecessor, a tax in labor, used by the Inca and the Hispanic, but also by the Peruvian state (ibidem).

[22] These offices are held for a year usually and involve "ceremony, pomp and circumstance", as well as mediation of conflicts, recruitment of *faena* labor, decisions on agricultural activities, supervision of fiestas and religious events etc. (Mayer, 2002:125f).

According to Mayer (2002:38f) stratification is rather diamond than pyramid shaped within highland communities:

1. A stratum of wealthy households that derive their dominance through unequal control of land and other resources (link to the outside, market access, off-farm labor via migration or translocality, more productive social networks, political connections).

2. A large group of middle peasants with mid-level access to land and heavy reliance on agriculture but also with important commercial links for cash crops and wages. They form the bulk of the support network of community institutions but seldom exert power within them.

3. Households with little or no land and "broken households" that depend on wealthier households through clientship relations because of their incapacity to sustain the independence of their domestic units. Those are usually referred to as "the poor".

In the current study, the communities defined two main groups (poor and non-poor). Chapters 9.1 to 9.5 discuss these groups in detail.

6.2.2 The Role of Women

It is misleading to assume that within a household access to resources or control over them are evenly distributed – for instance between the genders or ages. Several studies also show that the arrangement of out-migration from rural areas as a diversifying livelihood strategy depends on economic opportunities for men and women in the area of origin, those in the place of destination, and culturally determined economic gender roles. The gender roles in the households also influence the risk avoiding behavior in the households' strategies since women as administrators tend to be more risk-avoiding and in favor of securing the food and nutrition basis of the household than men, who usually have the spending power over extra (off-farm) income (e.g. Niehof, 2004)[23].

[23] The percentage of women living in rural areas decreased from 40.3 % in 1972 to 29.2 % in 1993. Of the economically active women, 21.1 % worked in the agricultural sector in 1981. More recent data is not available. A large number of rural women perform unpaid work in agriculture, especially in providing for household needs (FAO, 2005).

In Peru, women's roles differ according to geographic zones. In the mountain areas, where women participate in the peasant traditional economy, there is an increasing number of women heads of households due to male migration for work or to armed violence as well as polygamy. Overall, women comprise 19.5 % of heads of households in Peru (14.0 % in rural areas of Junín, 22.1 % in rural areas of Huancaveliva) (INEI, 2000). Women receive lower pay than men for the same or equivalent work (6.3.1).

According to the FAO (2005), in the highland, women participate in all the agricultural tasks, especially land preparation, sowing, banking, weeding, harvesting, and irrigation, taking care of the livestock and small-scale marketing. In whole Peru, women are responsible for all household tasks. Since women have the major responsibility for post-harvest activities such as processing and storage, they play a key role in household food security as well as in health issues. Women also play a key role in livestock, especially in regard to shepherding, feeding, milking, calving and dressing, while men typically tend to the shearing, disinfecting, and vaccination procedures. Rural women play a fundamental role in decisions regarding the household, including decisions related to production, use of resources, and expenditures.

However, women's decision-making role tends to be marginalized outside the household, especially in public decision-making bodies. Rural women have had to compensate for the lack of income in the time of economic crisis (6.2.3) by substituting industrial products by homemade ones or by reducing household expenses (often education of girls). Women have also had to assume greater responsibility for subsistence food production and, as producers for the market, have encountered severe restrictions in demand and decreased access to agricultural resources, land, water, credit and technology. Structural adjustment programs have had a negative effect on the rural poor, especially women, due to reduced spending on services (FAO, 2005).

These general findings about gender relations in the highlands also apply for the communities that participated in the study. While one community (Ñuñunhuayo) represented an exception (sharing of workload and gender relations in general were more balanced there) it can generally be said, that women are more vulnerable to poverty and that their empowerment is crucial for its alleviation.

6.2.3 The Highland Communities in Historical Perspective

In 1992, 5 680 peasant communities were recognized in Peru, which comprised 43 % of the total rural population of the country and cultivated 50 % of the total national land in production. In Junín and Huancavelica they consisted of an average of 100 households per community (Mayer, 2002:36f).

As well as being communities in the sense that they revolve around groups of people who live in the same place, they are peasant communities, *comunidades campesinas*, a legal designation accorded in 1919 and again in 1936 (at that time still labeled *comunidades indigenas*), entailing a community political structure, recognition by officialdom, a name, dedication to a saint and sacred places, inalienable rights to land and the need to organize communal work projects. Land is allocated to the collectivity; authorities are chosen locally, the community defines membership, rights, and obligations (Vincent, 2003:8; Mayer, 2002:35ff).

The history of the *comunidades campesinas* in Peru reflects an intertwining of local and state strategy. Even though the *comunidades campesinas* were just like their predecessors, the Hispanic *reducciones*, and the *comunidades indigenas* a product of nation-building[24] the *comunidades* came into being not only because of the patronage of well-meaning activists and the strategizing of an expanding state. Communities actively organized to seek this designation, which was optional for them. [25]

“Peasant communities in Peru have been sites of a tremendous amount of self-directed change in the past – perfect examples of autonomous participatory development” (Vincent, 2003:5). Indeed the enthusiasm, discipline and organization of the communities while taking part in the study was impressive.

The balance of subsistence and market agricultural production in Peru is partly dependent on traditional production patterns, but is also affected by state agricultural and industrial policy and more and more by market forces. For example, in the 1970s the government of General Velasco implemented an

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[24] For further information in Mayer, 2001:35 and Vincent, 2003.

[25] Long and Roberts (1978: 4) note that the communities most involved in national markets were the ones who applied for *comunidad indígena* status. Winder (1978) and Mayer (1979) for example, show how communities in the Mantaro Valley applied for status in order to protect local people’s access to resources (especially land), to plan development projects and because they thought they would get government assistance.

agrarian reform, recasting the *comunidad indígena* as the *comunidad campesina* (peasant community) – an economic designation in place of a cultural one. The reform also eradicated big land owners from the Mantaro Valley leaving small-holders and cooperatives that were very resistant against the communist rhetoric of the *Sendero Luminoso* (Shining Path). The *comunidad* and other collective agricultural organizations were the focus of state agricultural policy. However, alongside this apparent support for agriculture went a policy to promote industry through cheap food prices. The result was food imports and stagnation in national agricultural production (Hunefeldt, 1997). Controlled prices to satisfy the urban industrial work force continued through the 1980s, continuing the disincentives to produce food for the market.

The civil war waged by *Sendero Luminoso* and *Movimiento Revolucionario Tupac Amaru* (MRTA) as well as the government-induced *comités de autodefensa*[26] and the government troops themselves also disrupted agriculture as peasants in the affected regions fled to safer areas of Peru. Because of its complexity, the conflict in the Mantaro Valley was also referred to as the "war of the colors". The conflict was especially vile here because of the strategic importance of the region as a provider of food and electricity for the capital (von Oertzen, 2004). Furthermore, in the lowlands of the Mantaro Valley, the *Senderistas* entered into an alliance with the drug traffickers whom they protected against the government (IDL, 1996:59). Half of the country was in a state of emergency and over 20 000 people had been killed by 1990 (Starn, 1992:15). The militarization of the region still shows traces today in village organization, mistrust towards strangers, and female-headed households due to a deceased husband.

The guerrilla war itself was arguably the result of national processes causing social and economic inequality[27]. Hyperinflation was also added to the volatile environment in the 1980's. Inflation during the period of Alan García's presidency (1985-90) is estimated at 2.2 million percent (Boloña cited in Cameron 1997:61). This was a product of (and fed) the guerrilla war, as well as of inconsistent state economic policy throughout the 1980's. García's statement at the beginning of

[26] Who sometimes called themselves *rondas campesinas* and who play a vital role in village politics until today (IDL, 1991).

[27] The beginning of these processes probably dates back to the *conquistadores*. Inequality, racism and poverty in Peru are much older than the time frame discussed in this study.

his presidency that no more than ten percent of Peru's export earnings would be used to service foreign debts also played a role as international lenders retaliated by cutting off further funds. "The political and economic conditions, in which Peruvians lived, were dire" (Vincent, 2003:8). The economic crisis of this period has resulted in low investment and consequent low productivity in the agricultural sector. This has been exacerbated by environmental degradation, including desertification as a result of inappropriate agricultural practices, natural disasters and armed violence, which have caused displacement of large numbers of families and disrupted agricultural production. Drug trafficking and the production of coca have also disrupted agriculture. Due to the persistent falling prices of agricultural produce, production has also declined (FAO, 2005).

6.3 Degree, Dynamics and Causes of Poverty in the Study Region

6.3.1 Poverty and Human Development in Peru

Even though the Fujimori government reversed the economic crisis of the 80's towards macro-economic growth (3.5 % per capita real growth rate between 1994 and 1997), reduced inflation (from four-digit rates in the 80's to 7.5 % in 1997), reduced the budget deficit and raised tax revenue, in 1998 still a fifth of the Peruvian population was estimated to live in extreme poverty (4.6 Mio. people) and half the population in poverty (11.5 Mio. people). Income distribution in Peru has not changed very much during the 1990s. Inequality increased slightly compared with 1985. Particularly interesting are the gains of the middle income groups (third and fourth quintile), while the poorest 20 % saw their small share further reduced. Surprisingly, the wealthiest 20 % of the population also lost some of their share of income. Distribution of income is also reflected in different inequality measures. The Gini index[28] for 2000 was 49.8 %. However, as discussed in 4.1.2, monetary measures are insufficient to actually define and measure poverty. A study prepared on the different dimensions of poverty in

[28] The Gini index is the share of total income or expenditures that would need to be redistributed to achieve total equality. It lies between 0 and 100 percent. The smaller the more equal the distribution. So called Kuznets ratios, which compare for example top quintile and bottom quintile, show a similar picture. The ratio of richest 10 % to poorest 10 % was 22.3 in 1996. With a value of 11.7 the ratio of richest 20 % to poorest 20 % was significantly smaller (UNDP, 2003:283).

Peru for the Latin American Economic Association Meeting in 1999 came to the conclusion that, using the monetary measure for poverty of the 1994 ENNIV[29] survey and comparing it with a survey of stunting in children, many cases of malnutrition would go unnoticed: "[..] one in five stunted children is in a non-consumption poor household and more than 60 % of the poor children do not suffer from long-term malnutrition. Clearly, child malnutrition is a phenomenon whose determinants go beyond monetary poverty" (Laderchi, 1999:12). Concerning the group of extreme poor households, the study continues: "the percentage of children whose stunting goes unnoticed if using a monetary measure rises to half of the stunted children." (Laderchi, 1999:13)[30].

Morbidity is, according to this study even more loosely related to monetary poverty: "[…] three fourths of the morbidity cases would be missed out by something like a means tested intervention related to health" (Laderchi, 1999:25). After a similar comparison with educational indicators the study concludes with: "From the results presented it is clear that the parametric variations, which according to Sen's analysis make monetary resources a very imperfect indicator of achievements in terms of capabilities, exist and act as a very significant wedge between means and achievements. Direct indicators rather than monetary ones should be adopted for poverty assessments if one accepts Sen's claim that individual welfare should be evaluated in the capability space" (Laderchi, 1999:45).

To show a trend of Peruvian Development one can use the Human Development Indicator as measured by UNDP. The indicator improved from 0.69 in 1985 to 0.762 in 2005[31], placing Peru in the midfield of the countries (79 / 177) included in the UNDP exercise, close to the average of Latin America (0.797). Peru improved its performance in three basic dimensions of the indicator: literacy rate (72 % in 1970, 87.7 % in 2005), life expectancy (54 in 1970, 70 in 2005), and infant mortality (108 / 1000 in 1970, 33 / 1000 in 2005).

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[29] Encuesta Nacional de hogares sobre la Nivel de Vida (ENNIV), conducted by the independent Instituto Cuánto in 1994 and 1997. Those, and the ENAHO (Encuesta Nacional de Hogares) survey from INEI in 1996, were the main database of the World Bank study of 1999.

[30] It was found in the study that lack of service provision, infrastructure and maternal education correlated much stronger with stunting than income (Laderchi, 1999:24).

[31] Data from 2003.

Another way to depict the human development of Peru is the HPI–1 (4.1.2). In the year 1997 Peru was ranked number 28 with an HPI–1 value of 22.8 %. Five years later the HPI–1 value was 11.4 % and Peru ranked number 19. This means that in 2002 every tenth, or in absolute numbers 5.6 Mio., Peruvians were affected by human poverty. These are 2.5 Mio. Peruvians less than in 1997 when every fifth person lived in human poverty. The HPI-1 value for Peru in 2005 (12.0 %) ranks 26th among 103 developing countries, for which the index has been calculated[32].

The use of very different poverty lines for the sierra (700 NS) for poverty and 430 NS for extreme poverty per head and year) and e.g. Lima (950 NS and 500 NS, respectively) by the World Bank already indicates the urban-rural inequality: Forty five percent of the extreme poor are to be found in the rural sierra.

Since only 5.9 % of the Peruvian area can be cultivated, severe over-use led to soil degradation and deforestation. This afflicts especially the rural poor, since they make a living from agriculture. The development of appropriate cultivation techniques is hence an important means of alleviating rural poverty (World Bank, 1993).

The main factors contributing to rural poverty were – according to the World Bank (1999) – limited access to land (limited resources for agricultural production) and public services, as well as lack of income opportunities apart from agriculture. Since the majority of the sierra-population is indigenous, so is poverty: 79 % of the *indigenas* are considered poor, 55 % extremely poor. Some indicators also show how women are more afflicted by poverty. Peru has for instance one of the highest maternal mortality rates in South America (280 / 100.000), 70 % of Peru's illiterates are women (GTZ, 1998:1). The GDI value for Peru ranks at 67 with a value of 0.745[33]. The ratio of female-earned income to male-earned income was 0.27, making Peru rank at 150, after the Islamic Republic of Iran, ranking at 149 (0.28). The main findings of the INEI (2001) poverty study were that poor (and extremely poor) households were generally headed by younger household heads, that female-headed households were not generally more prone to be

[32] For the construction of the indices see 4.1.2.

[33] The gender-related development index (GDI), introduced in Human Development Report 1995, measures achievements in the same dimensions using the same indicators as the HDI but captures inequalities in achievement between women and men. The greater the gender disparity in basic human development, the lower is a country's GDI relative to its HDI.

poor[34], that access to education is the most important aspect in determining whether or not a household is likely to be poor, that low quality of employment and not unemployment characterize poor households, that poor households differ demographically from non-poor (that is they have more household members, especially under-age children) and that they have less access to public services (INEI, 2001:38ff). The World Bank (1999) study "Poverty and Social Developments in Peru between 1994 and1997" came to similar conclusions. It, too, states, that household size or the dependency rate mattered, because they influenced the households' capacity to save. Other findings were that "[...] more education means faster advancement" (World Bank, 1999:vi), and that savings and access to services (especially if they were "bundled") helped households advance directly and indirectly. The most surprising finding was that households were more likely to have advanced, if their income stemmed from the informal sector, than from the formal sector which was found to be valid in urban areas as well as in informal off-farm employment in rural areas.

6.3.2 Poverty and Human Development in Junín and Huancavelica

According to the poverty survey from INEI (2001), in the rural areas of Peru 78.7 % were considered poor and 48.0 % extremely poor. The poverty and extreme poverty rate for the rural areas of the sierra were 83.4 and 60.8 %, respectively. Huancavelica had a poverty rate of 88.0 % and an extreme poverty rate of 74.7 % while Junín had rates of 57.5 % and 24.3 % (INEI, 2001). An ENAHO survey from May 2003 – April 2004 gives figures of 57.3 % and 22.2 % for Junín and 88.5 % and 74.1 % for Huancavelica, respectively (INEI, 2005).

Social indicators and those relating to capabilities (mainly education and health) in the highlands are often many times worse than the national average (Table 6.2). Rising out of poverty is thus more difficult, when neither education nor basic health care can be attained, which are crucial for households' capabilities to pursue their livelihoods.

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[34] In a poverty study on Peru by the German Technical Cooperation (GTZ, 1998:13), this is explained by the fact, that only head's of households were surveyed that in 83 % of all cases were male. Hence only 12 % of the extreme poor and 15 % of the poor were females. This gender blindness of the data is ridiculed by other social indicators (income, illiteracy, maternal mortality etc.) see above and 6.3.2, which show the deprivation of women, especially in rural areas.

Table 6.2: Human Development in the study region: Huancavelica and Junín

	HDI		Life expectancy at birth (years)		Literacy (%)		Av. family income per head (NS per head and month)	
	Value	Rank[35]	Value	Rank	Value	Rank	Value	Rank
Peru	0.762	79	70	92	87.7		544.3[36]	14
Huancavelica (Department)	0.464	25	64.1	25	72.5	23	135.8	25
Tayacaja (Province)	0.439	176	64.5	164	72.5	154	132.5	187
Acostambo (District)	0.384	1781	62.7	1635	79.4	1126	139.0	1714
Pazos (District)	0.415	1700	63.1	1598	77.7	1197	132.1	1744
Junín (Department)	0.595	10	70.1	12	88.8	15	286.0	10
Huancayo (Province)	0.607	31	71.7	32	90.9	52	304.7	46
Cullhuas (District)	0.536	832	66.7	1120	76.3	1253	270.3	570
Jauja (Province)	0.603	33	69.6	76	89.2	59	289.1	50
Masma Chicche (District)	0.561	651	64.4	1458	82.7	939	252.4	649

Source: INEI, MEF, MINEDU; elaborated by PNUD, 2005

Huancavelica, where two of the communities that participated in the current study are situated (Huayta Corral and Aymará), is the figurehead of whole Peru as far as poverty is concerned. It has a very low HDI with a coefficient of 0.464, which puts it, in Peru, on the last position of human development (rank 25) (PNUD, 2005)[37]. Compared with other departments in the *sierra*, **Junín** has a relatively high HDI with a coefficient of 0.595.

[35] The ranking is between 25 departments, 194 provinces and 1828 districts.

[36] Income per capita, NS per month, 2003 (PNUD, 2005).

[37] Huancavelica ranks first (meaning poorest) in the INEI ranking for poverty and extreme poverty, as well as in the FONCODES ranking of 2000, and concerning its HDI and malnutrition rate in the same year. It was on rank 3 in the INEI ranking 1996.

This puts it, in Peru, in an upper medium range of human development. Among the 194 provinces of Peru, Huancayo is on rank 31 (PNUD, 2005) [38].

The gross mortality rate of **Huancavelica** is 13 / 1000 (Peru: 6.5 / 1000), the infant mortality rate figures 86 / 1000 life births (Peru: 42 / 1000). Life expectancy for the women between 1995 and 2000 was 12.0 years lower than for the average Peruvian woman. For men the difference was 11.2 years, respectively. Compared to the inhabitants of Lima the average difference of life expectancy is 20 years. Concerning public services the situation is no less frustrating: Fully 92.1 % of the population have no connection to public drainage services (Peru: 48.8 %), 64.9 % have access to drinking water (Peru 72.3 %) and 32.4 % public lights (vs. 69.3 %) – in the department that generates most of the electricity in the country (Atlas Departamental, 2003).

The illiteracy rate in Huancavelica is the third worse of Peru (10.7 %): 27.5 % of the total (PNUD, 2005; INEI 1993:34.0 %), 39.6 % of the rural and 19.4 % of the urban population, 47.7 % of the women and 18.7 % of the men (INEI, 1993). 79 % of the population older than five years of age have not received education higher than primary school In 1993 67 % of the population were Quechua speaking, one of the highest percentages in Peru (PNUD, 2005).

According to a census conducted by the Ministry of Education in 1999, 55.0 % of Huancavelica's children at the age of six were chronically malnourished (with a high of 65.3 % in the province Angaraes). For children whose mother speaks a native idiom the figure was 56.7 % (INEI, 2000).

The department faces high mortality rates and a high emigration: Between 1988 and 1993, 54,105 people abandoned their fields and left while only a quarter of that (13,015) emigrated into the department: most left for the national capital, while a noteworthy portion headed for the adjoining departments, Junín, Ayacucho and Ica. The emigration was strongest during the "period of violence" by which the department was heavily afflicted, and has continued solidly for economic reasons[39].

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[38] Junín ranks 16th in the INEI 2001 poverty ranking, 14th in extreme poverty, 13th in the FONCODES ranking, 14th concerning HDI, 9th concerning malnutrition and was 20th in the INEI ranking 1996.

[39] The population of Huancavelica in 2002 was 1.67 times the figure of the inhabitants in 1940 while the population of whole Peru grew 3.81 times. Between 1993 and 2004 Huancavelica had

The area stretching along the Mantaro River is the most densely populated of the department. The five northern provinces (one of which is Tayacaja with a population density of 34.6 inhabitants / km²), which make up 52.8 % of the territory, are hence home to 90 % of the population. The majority (70.7 %) of the department's population is rural, only 29.3 % of its inhabitants live in cities. Urbanization is slow, since most of the rural people emigrating from the countryside prefer to leave the department altogether. Female-headed households account for 22.1 % of all households (21 % in the countryside, 19.5 % Peruvian average) (INEI, 2000).

Between 1993 and 2004 the department **Junín**, where the other two communities that participated in the study are situated (Ñuñunhuayo and Casabamba), showed a demographic growth of only 1.4 % (compared to a 2.8 % from 1972 to 1981)[40]. The province of Huancayo (where Casabamba is situated) is, with 13,391 inhabitants / km² by far the most densely populated province of the department. Jauja has a population density of 30.52 inhabitants / km². Junín is the most urbanized department in the sierra: 59.3 % of its inhabitants live in cities, with 81.4 % of the urban population living in Huancayo. Urbanization in Junín has accelerated at an astonishing pace in the last decade.

The gross mortality rate of Junín is 7.2 / 1000 (Peru: 6.5 / 1000), the infant mortality rate is at 48 / 1000 births (Peru: 42 / 1000). Life expectancy for the women and men in Junín is 1.3 and 1.2 years lower, respectively, than for the average Peruvian.

Concerning public services the situation is somewhat different: While only 43.3 % of the population have a connection to public drainage services (Peru: 51.2 %), 78.6 % have access to drinking water (Peru: 72.3 %) and 76.8 % public lights (Peru: 69.3 %), (Atlas Departamental, 2003). The illiteracy rate in Junín is slightly higher than in the rest of Peru (10.7 %): 11.5 % of the total (PNUD, 2005; INEI 1993:13.4 %), 18.1 % of the rural and 10.4 % of the urban population (INEI, 2000), 20.2 % of the women and 6.3 % of the men are illiterates (INEI, 1993).

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a growth rate of 1.3 %. Tayacaja, where Huayta Corral and Aymará are located had a growth rate of –2.1 % in the years 1972-1981. From 1993 to 2002 it was a mere 1.0 %.

[40] The population of Junín in 2002 was 3.27 times the figure of the inhabitants in 1940 while the population of the whole of Peru grew 3.81 times. The population growth in Jauja province, where Ñuñunhuayo is located had a very low growth rate compared to others (1972-1981:0.9 %, 1981-1993:0.1 %, 1993-2002:0.6 %).

According to INEI (2000), 42.1 % of Junín's children at the age of five and older were chronically malnourished. A figure, that is high, but lower than for any other highland province, except for Áncash. For children whose mother speaks a native idiom the figure rises to 62.5 %.

There is a strong flux of migration, especially out of the department: The net figure is almost 60,000 people emigrating between 1988-1993 (127,273 emigrating from Junín and 67,880 entering it) with the main destination being Lima, with 92,000 immigrants from Junín in that period. At the same time there is immigration from other departments that are still poorer than Junín (e.g., 13,000 from Huancavelica in the same period) (Atlas Departamental, 2003).

6.4 Types of Small Farmers in the Mantaro Valley

A clear categorization has enormous explanatory value for understanding livelihood strategies and behavior of different groups of small farm households (4.2.2). It can help to develop intervention strategies of research institutions and extension services on an aggregated level above single households.

In the Mantaro Valley, though, to find a clear typology of small farm households is not an easy issue. Unlike other agro-regions of Peru, "where a sharp distinction can be observed between peasant and commercial agriculture, the Mantaro Valley case is blurred" (Mayer, 1979: 97). This is due to a mosaic-like pattern of agroecological conditions and to historical concentration and differentiation processes in indigenous as well as in colonial farming types (Mayer, 1979: 87).

Box 6.2: Current tendencies and social aspects of peasant production

Social aspects of the peasant production systems in the Mantaro Valley can be described by four main tendencies:

1. Historically long-term communal creation of specialized production zones is now contrasted with the individual household's access to portions of the zone.
2. The communal creation and enforcement of rules for each production zone, stands nowadays versus individual compliance or resistance to the rules.
3. The communal coordination of the agricultural calendar today is contrasted by free allocation of productive labor and time.
4. The communal utilization of labor, which is contributed by the households for certain production activities, today faces free allocation of labor resources by households.

Source: Mayer, 1979:88

In the intermediate and upper agro-life zone of the Mantaro Valley, where the four investigated communities are situated, the peasant-farm type is still by far the most common. Box 6.2 gives an overview over social processes, which are until nowadays changing the peasant production system. The subdivisions, which were identified by Mayer (1979: 88-91) in this broad category still remain valid. Generally they can be distinguished between:

- Subsistent or self-sufficient farmers, and
- Peasant commercial farmers.

The term “subsistence” can imply:

1. A farmer that barely “survives” on his farm.

2. A farmer, who produces everything he needs to live sufficiently on his own land without participating in the market. Concerning this, already in the late 1970's it was evident that, “today, however, no Mantaro family can live without a steady source of cash: the self-sufficient strategy can only be pursued if there are other sources of cash available to the family” (Mayer, 1979: 89).

Peasant commercial farming can be also found with two contrasting conditions:

1. Non-farm sources of cash are limited, and the family is forced to devote its insufficient land resources to generate both food and cash. “This type of commercial peasant farmer will not convert his fields or his practices to grow cash crops. Rather he will sell parts of his subsistence crops in order to get cash, often literally at the expense of his stomach” (Mayer, 1979: 90).

2. Some peasant families have enough capital assets (land, labor), so that farming brings better income than non-farm sources. These farmers convert parts of their land to cash cropping. The decision of what crops to grow will no longer be determined by nutritional preferences as in the subsistence strategy, but in part by market conditions.

Generally, the high dynamics of this situation must be stressed: “It is very easy to shift back and forth between the subsistence and the commercial strategy; since the conversion costs from one to the other are low and off-farm income sources are unstable” (Mayer, 1979: 91).

Even though there is an enormous variety of transition forms and confusing complexity in the Mantaro Valley (Franco & Horton, 1979: 30ff), CIP tried to develop a workable typology of small farmers' households. During the strategic planning in 2003 the following three categories were used:

- Food security farmers,
- Market oriented farmers, and
- Income-diversified farmers.

According to this typology, food security farmers mainly try to “ensure food availability for the household through on-farm activities, improve productivity and minimize internal inputs” (CIP, 2003: 6). Income diversified farmers aim to “ensure the contribution of the crops to the total income of the household”, while market oriented farmers respond with their cropping decisions to “specific requirements of market opportunities” (CIP, 2003: 6). While conducting the current investigation it turned out that these categories overlap in many cases (7).

6.5 Agricultural Production and the Dynamics of Potato Production

6.5.1 Most Important Crops in Peru and the Departments of Junín and Huancavelica

Due to its unique climatic and morphologic characteristics, Peru comprises an enormous variety of eco-zones. This allows the cultivation of a large variety of agricultural products. In the national agricultural statistic more than 50 different crops are listed. Among these, potato plays an important role. In 2003 in whole Peru, an area of 258,017 hectares was cultivated with potato. This number is only topped by maize and coffee. Peru’s total potato production in 2003 had a total value of more than 1.4 billion NS (430 Mio. US $) (INEI, 2004:641).

In the departments of Huancavelica and Junín, the national agricultural statistic lists approximately 20 different crops for human consumption and cattle feeding.

Along with coffee, which is grown in the high *selva* eco-zone, potato is the most important crop concerning cultivated area and total production in the department of Junín. In the cultivation period 2004 / 2005 with 22,206 ha most of the cultivated area in the department was used for potato cropping.

A total of 302,686 t of potato was produced (MINAG, 2005b). This was followed by barley (12,029 ha / 10,681 t) and maize *amilaceo* (9,216 ha / 8,303 t) (MINAG, 2005b).

In the same cultivation period in the department of Huancavelica, the biggest area with 16,746 ha was cultivated with barley. This was subsequently followed by potato; with 15,430 ha of cultivated area and a total production of 134,038 tons. Furthermore, maize and wheat play an important role in terms of cultivated area and total production (MINAG, 2005b).

The communities, which participated in the current investigation, belong to the provinces of Tayacaja, Jauja, and Huancayo (6.1.1). In the provinces of Tayacaja and Jauja, regarding both cultivated area and total production, potato is the most important crop. In the case of Huancayo province, the picture is different, though. Most of its territory is situated in the low agro-life zone at the floor of the Mantaro Valley (6.1.3). Here in terms of cultivated area and total production potato plays a minor role, whereas maize, barley, and wheat prevail.

The districts where the participating communities of the current study are located produce about 12 different crops, potato is one of the most important (Table 6.3).

Table 6.3: Most important crops in the districts of the study region (cultivated area in ha 2004 / 2005)

District	Most important crop		Second most important crop		Third most important crop	
	Crop	ha	Crop	ha	Crop	ha
Acostambo (Huayta Corral)	Barley	585	Potato	345	Peas	135
Pazos (Aymará)	Potato	1860	Maize Amilaceo	245	Faba Bean	115
Masma Chicche (Ñuñunhuayo)	Potato	71	Ulluco	33	Barley	30
Cullhuas (Casabamba)	Barley	420	Wheat	237	Potato	207

Source: MINAG, 2005b

6.5.2 Potato Production in the Departments of Junín and Huancavelica Over the Last 15 Years

Comparing potato production in the department of Junín in 1990 and 2004, a slight increase can be noticed. This is true for both cultivated area and total production (Figure 6.2). The development of potato production however has not been a linear process. While in 1990 170,000 tons had been produced, in 1992, because of the *El Niño*[41]-phenomenon, only 58,000 tons could be harvested. After this shock, the cultivated area and total production increased and peaked in 1995 at a level of 24,400 ha and 275,000 tons, respectively. After a decline in 1996, still at a comparatively high level, the cultivated area and total production did not fluctuate until two years of record production in 1999 and 2000. In the year 2000 potato cropping area was 27,000 ha, while total production reached 400,000 tons. From 2000 onward the cultivated area and production have decreased and the figures were 320,000 tons and 22,000 ha in 2004. The reason for this decline might have been the cultivation recommendations of the MINAG (Box 6.3) to prevent overproduction of potato due to decreased demand. On the other hand, there are also fluctuations caused by weather variations from year to year.

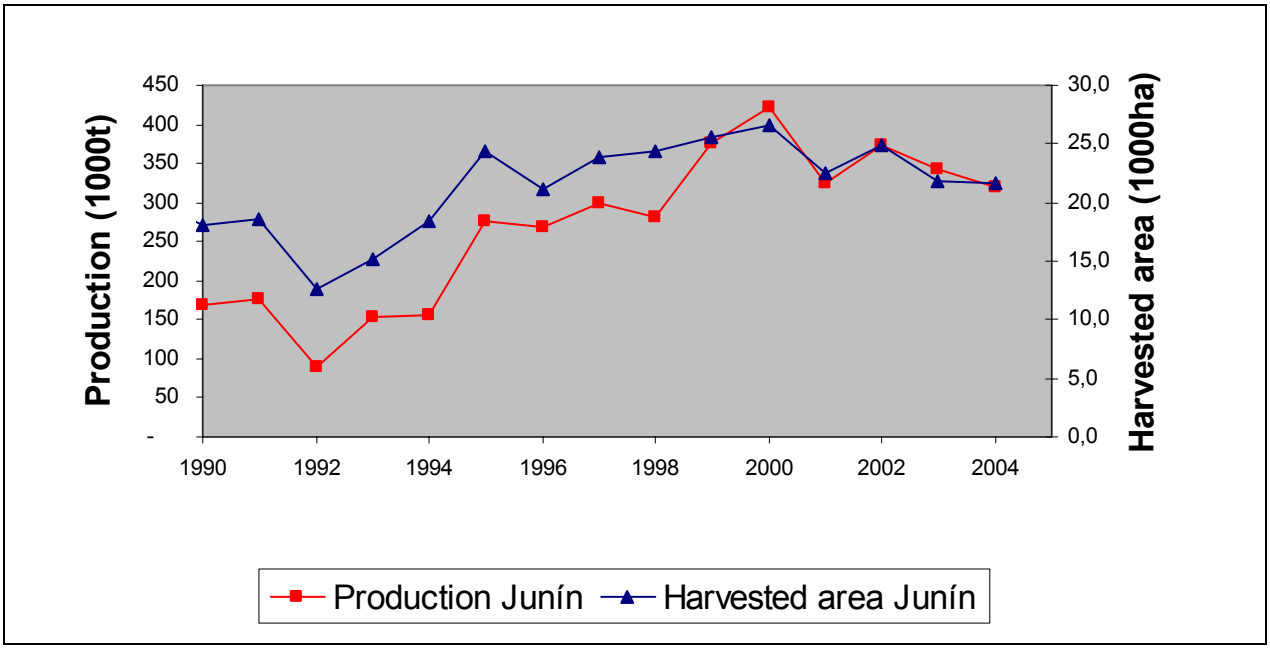

Figure 6.2: Potato production and cultivated area in Junín (MINAG, 2005b)

[41] *El Niño* is a disruption of the ocean atmosphere system in the Tropical Pacific. At the West Coast of South America, *El Niño* especially causes increased rainfalls (NOAA, 2005).

Box 6.3: Risk of price fluctuations and cultivation recommendations by the Peruvian Ministry of Agriculture

Peru's potato market is entirely deregulated. No minimum prices exist. The mere rule of offer and demand in combination with a widespread lack of information do not allow the single farmer to calculate well the profitability of potato production and force him to speculate in prices. This situation by itself causes a typical pattern of price fluctuations from one year to the next. If in year one, potato prices are high farmers will expand their potato production in year two hoping to increase their income. Accordingly there will be a higher supply of potato to the markets, at harvest time of year two, though prices will be much lower, than in the year before. Farmers then have to compensate their additional costs of the increased investment in potato.

In an attempt to interrupt this cause-effect-chain in August 2005, Peru's Ministry of Agriculture (MINAG) issued a communiqué, which calls potato farmers to limit their areas of cultivation to a certain maximum and recommends farmers in the Andean highland to rather produce native than improved potatoes. This communiqué is based on constantly assessed data on farmers' cropping intentions in the different potato producing regions of Peru. However, it has only recommendational character: "Peasants are free to make their cropping decisions" (Valencia, 2005).

Source: Keller, 2003:23; MINAG, 2005c, and DAR Junín 2005

Even though the cultivated area and total potato production are more modest, the dynamics have been similar in the department of Huancavelica (Figure 6.3). With the exception of the 1992 *El- Niño*-year, from 1990 to 2000 both cultivated area and total production increased steadily until the year 2000. In 1999, a peak of 190,000 ha was reached for the harvested area and in 2000 for a total production with 20,900 tons. After the year 2000, both indicators decreased somewhat and reached in 2004 13,800 ha and 121,000 tons, respectively.

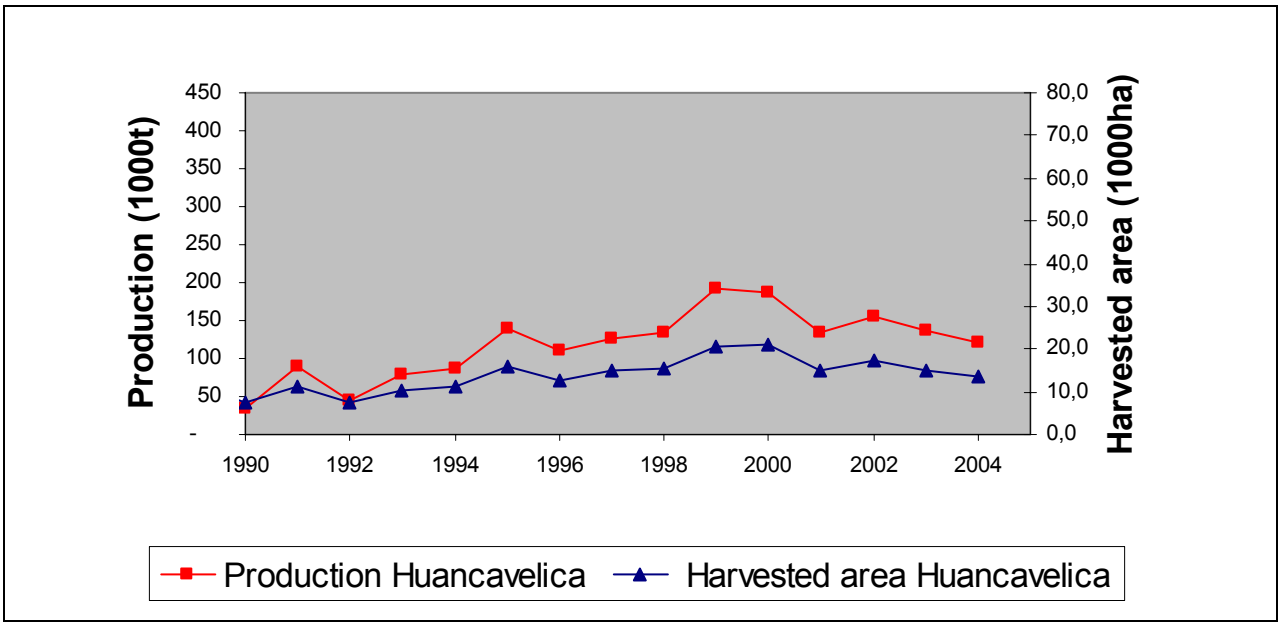

Figure 6.3: Potato production and harvested area in Huancavelica (MINAG, 2005b)

From 1990 to 2004 yields increased in Huancavelica and Junín as well as in Peru on average (Figure 6.4). The fluctuations in the departments of Junín and Huancavelica can be explained by extreme weather conditions, such as *El Niño* in 1992 or a following drought in 1993.

In 2004, in the Department of Junín, with an average of 14.8 t / ha comparatively high potato yields were attained, whereas in the department of Huancavelica average yields figured only 8.8 t / ha. This gap can be explained by the different natural characteristics of potato-growing areas in the both departments. While in Huancavelica the prevalence of mountainous relief determines a small farm cultivation of potato, the existence of broad valley plains in Junín allows irrigated, input intensive potato production at large scales oriented to satisfy the needs of the Lima market.

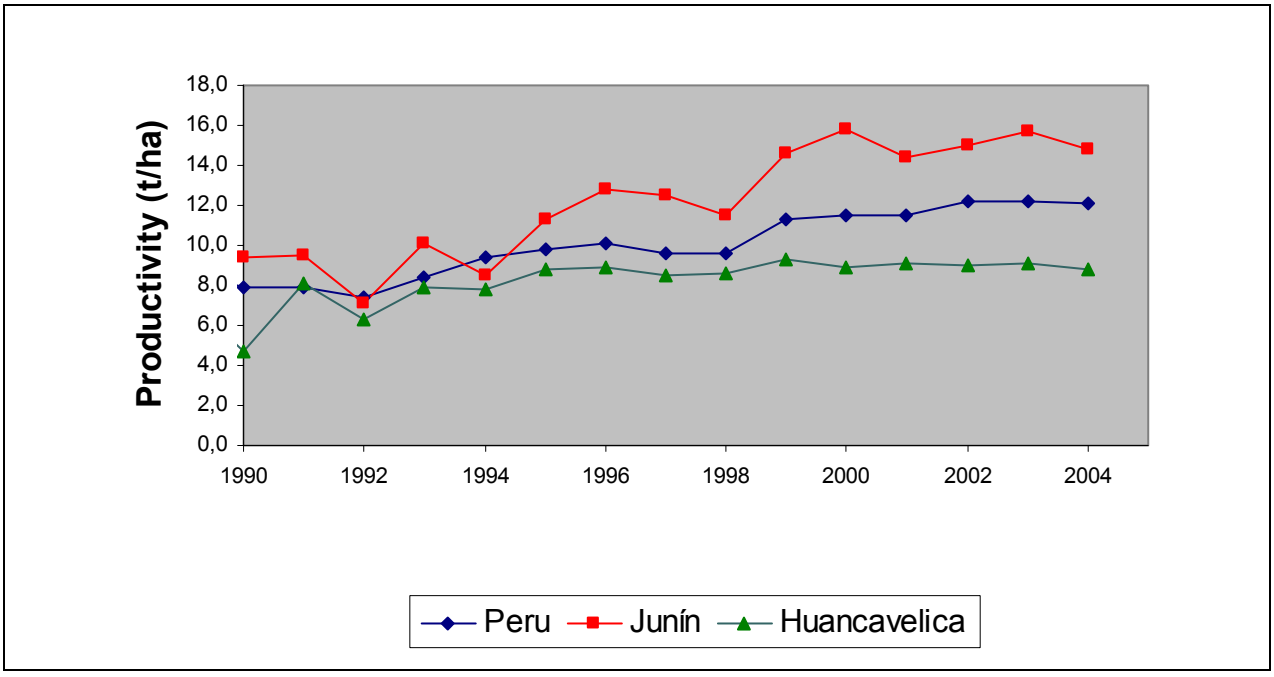

Figure 6.4: The development of yields in Peru, Junín and Huancavelica over the last 15 years (MINAG, 2005b)

Average purchase prices for potato in the period from 1996 until 2004 in the departments of Junín and Huancavelica vary between 0.7 to 0.2 NS (0.2 to 0.06 US $) (Figure 6.5). Such fluctuations are mainly caused by differences in total production, which is heavily dependent on weather conditions, but also on cropping decisions of the farmers (Box 6.3). The fact that all curves go parallel with the Peruvian average suggests that prices are formed at the national level. When in one region, due to crop failure prices are supposed to rise, imports from less affected regions buffer this effect. The differences between the departments and the Peruvian average can be explained by transport costs.

Due to its comparatively high productivity and total production, purchase prices in Junín are lower than in Huancavelica and the Peruvian standard.

It is most crucial to small farmers' economies that the purchase prices from 1996 to 2004 have decreased (Figure 6.5). A farmer in the department of Junín, for example received 0.41 NS for one kg of potato, whereas in 2004 it was only 0.30 NS. The prices of native potatoes are generally higher, than those for improved potatoes. Besides the dynamics of native potato prices do not necessarily follow the dynamics of improved potatoes.

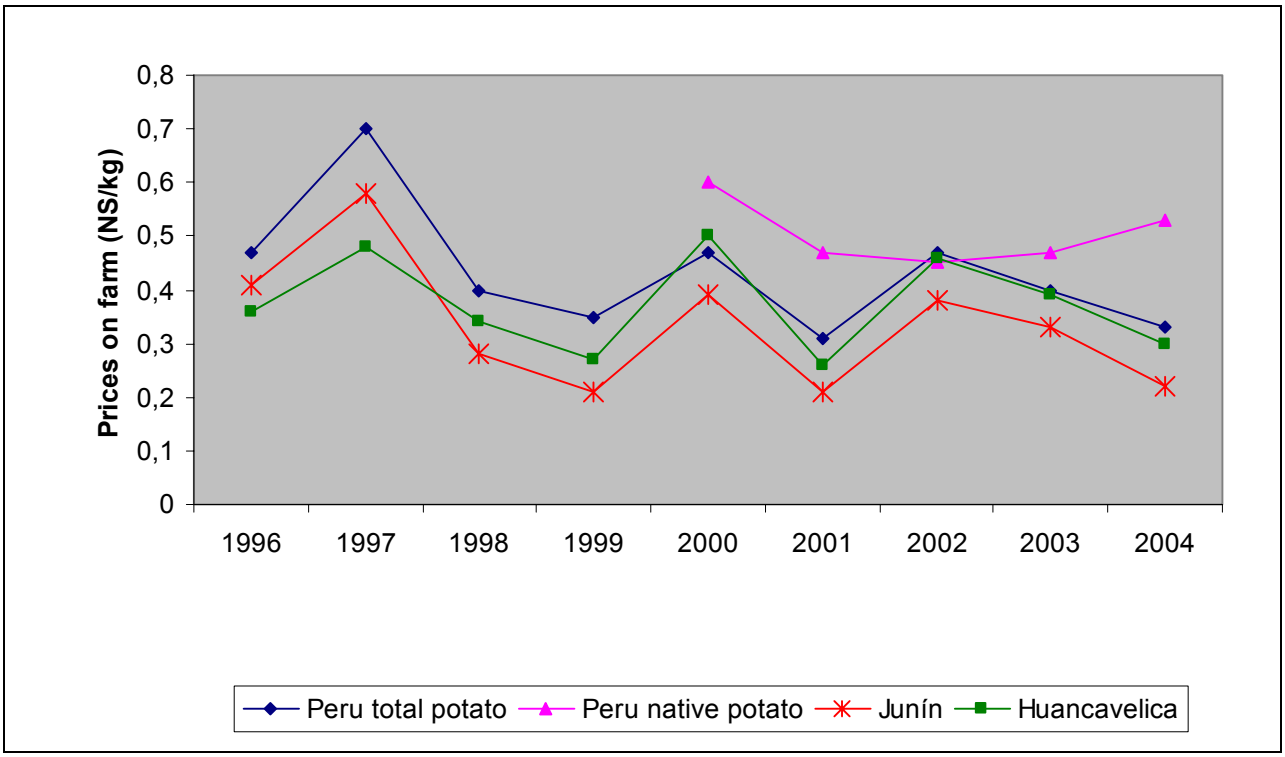

Figure 6.5: The development of prices in Peru, Junín and Huancavelica 1996-2004[42] (MINAG, 2005b)

Overproduction can be considered the main reason for sinking potato prices. This is to some extent a result of highly specialized, large-scale cash crop farms, but also a consequence of a decreasing demand and less potato consumption at national level. While in the 1950's, each Peruvian consumed approximately 128 kg of potato each year; today it is less than 83 kg (DAR Junín, 2004:9f). The importance of potato for Peruvian plates has become partly substituted by

[42] Statistical data is only available from 1996 onward. Only from the year 2000 onwards are separate statistics available for native potatoes.The displayed prices are adjusted to inflation and transformed due to the currency reform under the Fujimori government.

noodles and rice. Potato, with an estimated investment cost of US$2,500 / ha[43], is by far the most capital-intensive crop (Keller, 2003: 21). High investment costs and the risk of low potato prices are a real problem for small farmers, who do not have large capital assets and furthermore no access to credits (9.6.2). The Ministry of Agriculture of Peru tries to buffer price fluctuation by issuing cultivation recommendations (Box 6.3).

6.6 Policies and Institutions

6.6.1 Land Reform and Agricultural Policy

Concentration of land ownership in Peru was immensely high when the first agrarian reform law passed in 1964. The Gini coefficient for landholdings in 1961 was 0.935. Approximately 4 % of the rural population owned 56 % of the arable land, while 96 % of the rural population owned 44 % of the land. Opposition from large landowners and weak legislative and other institutional supports resulted in very low levels of implementation of this first reform.

The military government under President Velasco introduced a new land reform legislation in 1969. All farms above regionally determined thresholds sizes were expropriated. Expropriated land was assigned to production cooperatives in the highland *campesino* areas. The reforms resulted in the substitution of one large unit (large private farm) with another (large collective) and did not lead to the return of land to *campesinos*. Large haciendas were transformed into cooperatives of several types, which survived until the 1980's when a privatization of collective farms started: Growing calls for individual holdings in rural areas engendered a new series of reforms directed at the individualization of collective cooperative holdings in 1981 (International Land Coalition, 2005).

In August 1990 the newly elected President Fujimori implemented a profound structural adjustment program. The program impacted directly on the country's poor. All restrictions on the individualization and transfer of property were lifted, with the exception of recognized *productive* indigenous lands. In 1991 a special project for land titling and rural cadastre was implemented. This project permits the titling and registration of all holding, which resulted from the individualization of cooperative holdings. The rate of registration has been slow because of land

[43] These costs were estimated for one hectare of rain fed potatoes (Keller, 2003:21).

conflict and limited institutional capacity. A further significant change for the land tenure system is the "Law of private investment to promote the development of economic activities in the lands of the national territory and in the *campesino* and indigenous communities". This law seeks to promote private property in the countryside. *Campesino* organizations have protested against the law, claiming that it does not guarantee their legal ownership of communal lands. Only 2,000 of the 5,200 *campesino* organizations (covering 18 Mio. ha and 717,000 *campesinos*) that have been recognized possess registered land titles. The law does not say how they can acquire their land – particularly important now that this land can be freely bought and sold (International Land Coalition, 2005).

The structural adjustment program also affected the support programs for the rural sector. “The agricultural policy in Peru during the 1990s addressed the reduction of subsidies, the promotion of free market relationships and the participation of the private sector in research and provision of information. In a decade (from 1991 to 2001) the *Instituto Nacional de Investigación y Extension Agraria* (INIEA) went from almost disappearing as a governmental research institution to once more starting to reorganize its role as a public institution in charge of agricultural innovation” (Ortiz, 2005) National programs such as FONCODES or PRONAMACHCS (*Programa Nacional de Manejo de Cuencas Hidrograficas y Conservación de Suelos*) have been reduced from 1997 until 2003 by 25 %[44]. The Ministry of Agriculture’s resources for the Infrastructure for Social and Economic Development program were reduced from 281 Mio. NS (US$ 90) in 1997 to 177 Mio. NS (US$ 57), in 2003.

Between 1994 and 2004 the number of FONCODES projects for social assistance was reduced from 3 632 to 543. The projects on economic infrastructure were reduced from 700 to 417 (among those, the projects related to agriculture were reduced from 390 to 96). In addition, those projects dedicated to the development of production were reduced from 77 to 16 (those related to agriculture from 65 to 1). Out of the 3,632 projects for social infrastructure in 1994, 543 were left in 2003. The 264 projects for social assistance were reduced to zero in the same time frame.

[44] From 316 Mio. NS (US$ 100) spent on the governmental program against extreme poverty in the category agriculture in 1997 to 232 Mio. NS (US$ 74,8 Mio) in 2003, and from 626 Mio. NS (US$ 200) spent by FONCODES for the same program, and same time to 485 Mio. NS (US$ 156).

Between 1993 and 2003 FONCODES projects in Huancavelica were reduced from 243 to 39 and in Junín from 309 to 43 (INEI – ENAHO-IV trimestre, 2001 – 2002, 2003 / 2004).

On the other hand, new resources have been made available to local municipalities through transfers in the course of Peru's decentralization process. The successful continuation of the decentralization, especially in financial terms, will decide whether regional and municipal bodies can succeed with implementing necessary support measures for a sustainable development, especially in the rural areas of Peru, similarly to the departments of Junín and Huancavelica.

The governments in the last decades have demonstrated a lack of a long-term policy for agricultural development, and changes in the sector have responded more to political interest – e.g. the heavily politicized agricultural support programs, like PRONAMACHCS during Fujimori's regime – and external factors than to the real needs of the agricultural sector in Peru[45]. "By 2004, the government was trying to rebuild the research and extension system; but the trend in agriculture is to privatize services and co-finance investment. This process appeared to be very difficult in practice because most of the farms in Peru, particularly those which produce potatoes, are still oriented to subsistence with limited access to markets and weak organizational capacity. This does not permit most farmers to pay for extension services. The transfer of information provided by government services has become reduced and new organizations (mostly private, such as NGOs) have increased their importance as sources of information about agricultural technology" (Ortiz, 2005).

6.6.2 Activities in the Field of Potato Production by CIP and Main NARES in the Mantaro Valley

A range of different organizations is active in the field of potato production in the Mantaro Valley. The main actors are governmental organizations, research institutions, and NGOs. The main stakeholders working in the field of potato production gathered in June 2005 for a workshop at the CIP's research station in

[45] The World Bank (1999:vii) states that the distribution of the 7.6 billion NS for social and anti-poverty expenditures (about 40 % of the total public budget in 1996) had been disappointing because the poorest received less than their population share. This tilt towards the better-off was largely due to the anti-poor distribution of higher education and hospital expenditures.

Huancayo. The objective of the workshop, initiated by CIP, was to analyze the information systems and the agricultural knowledge about potato production of the different types of organizations working in the Huancayo region. The outcome of the workshop is the Agricultural Knowledge and Information System (AKIS[46]) (Engels, 1997). One important objective of the establishment of the AKIS is the identification of the organizations working with the potato crop and their geographical intervention areas in the Huancayo region. This system was diagnosed to avoid double interventions and to concentrate future efforts by exchanging information and implementing joined activities. This coordination could lead to more effectiveness of interventions. This is an important step, due also to the scarce financial resources many institutions have to deal with.

Table 6.4 gives an overview of the most important organizations that have been identified by the current study, and their activities. A detailed description of the activities from CIP and INIEA in the Mantaro Valley follows below. [47]

[46] The Spanish abbreviation for AKIS is SICA (*Sistema de información y conocimiento agrícola*).

[47] For more details see the AKIS (SICA) report from June 2005, available at CIP.

Table 6.4: Main actors in the Mantaro Valley and their cooperation activities

Type of Organization	Name of organization	Main activities	Main cooperation partners and type of services / cooperation activities	
			Name	**Type of services / cooperation provided**
Research institutions	CIP, Huancayo	Research Conservation of genetic resources Capacity building Introduction of new varieties	INIEA	Provision with genetic material, technology transfer, capacity building, exchange on soil analysis
			UNCP	Research possibility: Approx. 20 internships at CIP per year, various thesis in cooperation with CIP
			FOVIDA	Commercialization, processing and value adding of potatoes (e.g. chips)
			Farmers	Participatory research and investigation, technology transfer and capacity building (clean potato varieties, integrated pest management, local gene banks)
	UNCP (Universidad Nacional del Centro de Peru), Huancayo	Scientific research and investigation	CIP INIEA	Agricultural research and investigation for study projects and university thesis in collaboration with potato research institutes
Governmental institutions and programs	INIEA, Huancayo	Investigation Conservation of genetic resources Transference and extension Capacity building	CIP	Exchange on soil analysis
			UNCP	Research
			Farmers	Technology transfer: Selling of seeds, soil analysis, technical assistance and services, capacity building: Commercialization and processing of potatoes
	SENASA (Servicio Nacional de Sanidad Agraria), Huancayo	Agricultural health support	Farmers	Technology transfer and training: Pest management, vaccination of large animals, training on healthy storage of potatoes

Type of organization	Name of organization	Main activities	Main cooperation partners and type of services / cooperation activities	
			Name	**Type of services / cooperation provided**
	PRONAMACHCS (Programa Nacional de Manejo de Cuencas Hidrograficas y Conservación de Suelos), Huancayo	Sustainable management of natural resources Water management Soil conservation	Farmers	Irrigation infrastructure, reforestation, soil conservation
NGOs	FOVIDA (Fomento de la Vida)	Technical assistance and capacity building	Farmers	Processing and value adding of potatoes, commercialization support, organizational support
	PRISMA (Proyectos de Informática, Salud, Medicina, Agricultura)	Financial assistance, health and nutrition	Farmers	Agricultural Micro-credit
	CARITAS Peru	Technical assistance and capacity building	Farmers	Technical assistance, sustainable land management (soil improvement, forestation), livestock breeding support
	CARE Peru	Technical assistance and capacity building	Farmers	Technical assistance in crop diversification, sustainable land management, commercialization
	TALPUY (Grupo de investigación y desarollo de ciencias y tecnología andina)	Technical assistance, capacity building, ecological education magazine “Minka”	Farmers	Technical assistance in agriculture and rural development, training in sustainable management and conservation of natural resources, organizational development of villages
	SEPAR (Servicios Educativos, Promoción y Apoyo Rural)	Micro credit, sustainable development	Farmer represent-atives	Capacity building for local authorities and producer associations

Source: SICA- Report, June 2005 and interviews with organizational representatives

CIP's Activities in the Mantaro Valley

CIP's main research station in the Andes is located in Huancayo. Most of CIP's research divisions conduct activities in the station or in farmers' fields. CIP investigates in conventional form (experimentation) as well as in a participatory way. Workshops, meetings, the participatory evaluation of new technologies, demonstration plots, and field days serve to transfer research results. The results of the activities are also disseminated via the use of articles, folders, manuals, and web pages. The activities that CIP conducts together with the farmers are mainly capacity building, technology information, and transference (e.g. integrated pest management), and participatory investigation at pilot area level. CIP supports peasant communities with the conservation of native potatoes in local gene banks. CIP Huancayo also helps to repatriate formerly local native potato varieties in 35 communities of the Mantaro Valley. These communities were affected by terrorist activities from *Sendero Luminoso* and many people migrated to the cities. The possession of formerly around 30 to 40 varieties of native potatoes was reduced to only 4 to 5 varieties. CIP helps those communities to repatriate their varieties by giving them clean, virus free varieties of traditional native potatoes. The production of new seeds and the evaluation of germplasm are done in cooperation with different institutions, like the UNCP, INIEA, and the farmers. CIP also provides INIEA with clean, virus free genetic material and training.

INIEA's Activities in the Mantaro Valley

In accordance with the national law No. 28076 of 26 September 2003, INIEA is responsible for investigation, technology transfer, technical assistance, and the conservation of genetic resources. Agricultural extension and seed production are further areas of responsibility. INIEA Huancayo is hosting the national potato program; therefore exchange of knowledge is done through cooperation with CIP. The technology transfer to the farmers is supported from organizations like CIP, which provides INIEA with new potato varieties and information about research results. INIEA hosts a rental service for agricultural machines, e.g. farmers can rent tractors and other technical equipment. INIEA also conducts training for farmers of the region, e.g. on processing and commercialization of potatoes.

7 Profile of the Participating Communities

After an introduction in the study region on department, province and district level in chapter 6 , this chapter 7 presents a study-related profile of the participating communities. It explains by which criteria the communities were selected (7.1) and gives an overview over demographic characteristics, the capital assets and the vulnerability context of the four participating communities (7.2). A further focus is laid on the village economics, including the types of farmers (7.3) and the most important crops in the four communities (7.4). At the end of the chapter a short description of the activities of CIP an NARES is given (7.5).

7.1 Selection of the Communities

CIP selected the communities for the current study. Because the focus of the study is on poverty determinants, the main criteria used by CIP for selecting the communities have been the poverty levels (Table 7.1).

Table 7.1: Communities that participated in the study: Location and poverty rate

Stratum (Poverty rate)	Department	Community	Province	District	Poverty rate[48]
1: > 95 % (Extremely poor)	Huancayo	Huayta Corral	Tayacaja	Acostambo	97 %
		Aymará	Tayacaja	Pazos	98 %
2: 85 % - 94 % (Very poor)	Junín	Ñuñunhuayo	Jauja	Masma Chicche	92 %
3: 75 % - 84 % (Poor)		Casabamba	Huancayo	Cullhuas	79 %

Three levels of poverty have been defined, based on the poverty index developed for the poverty map of FONCODES (2000), which coincides with the poverty index used by the Ministry of Economics and Finances (4.1.2). The first stratum consists of communities in extreme poverty. The rate of poverty is higher than 95 % and equals the poverty levels of the 40 poorest districts in Peru. The second stratum consists of very poor communities located in districts with rates of poverty between 85 % to 94 %. The third stratum includes poor communities with poverty rates from 75 % to 84 %.

[48] Rates refer to the districts, estimated in the Poverty Map generated by FONCODES (2000). For the construction of the index see 4.1.2 and FONCODES (2000).

Huayta Corral and Aymará belong to the Department Huancavelica. Ñuñunhuayo and Casabamba belong to the Department Junín. All communities are situated in the catchment area of the Mantaro Valley or the surrounding mountains.

According to CIP, apart from poverty levels further criteria for community selection have been:

- Location in agro-ecosystems (between 3,000 – 4,000 m a.s.l.) where potatoes are an important component,
- Logistic reasons, accessibility and contacts with farmers in the communities to facilitate the work,
- Distance to market,
- Subsistence and commercial farmers with intermediate stages, and
- Different pest and disease problems relating to altitude.

7.2 Main Characteristics of the Participating Communities

7.2.1 Demographic and Social Characteristics

Some general information about the communities that participated in the study is presented in Table 7.2:

Table 7.2: Communities that participated in the study: Overview

Characteristics	Huayta Corral	Aymará	Ñuñunhuayo	Casabamba
Year of constitution	1972	1920	1926	1940
Altitude (m a.s.l)	4200	3933	3840	3800
Total area (ha)	1276	1800	1,200	1352
Area in communal property (ha)	10	1282	50 ha for communal production, 550 ha for private production	25

Source: Workshop with community authorities

In a workshop[49] conducted with village presidents, other leaders of the communities and key informants in Huancayo, all of the community representatives, except for the ones from Aymará, indicated that community

[49] Workshop with community authorities, August 19, 2005, Huancayo.

organization, and participation of the *comuneros* decreased in the last 15 years. Most of the farmers were still members of the community though: In Huayta Corral 54 of 62 villagers are community members, in Aymará 70 of 95, in Ñuñunhuayo 42 of 45, and in Casabamba 18 of 23[50].

As for organizations apart from the *comunidad*, 17 of 32 people interviewed in Huayta Corral are not organized in any way, in Aymará the number was 15 of 41, in Casabamba 9 of 17, Ñuñunhuayo 10 of 30. The most prominent forms of organization were the parents' association (with Aymará having 14 of 41 organized there, Huayta Corral 2 of 32; Casabamba 2 of 17; Ñuñunhuayo 7 of 30) and the milk reception committees. Only Aymará (8 of 41) and Ñuñunhuayo (1 of 30) had people organized in producers' associations. In Ñuñunhuayo 3 of 30 interviewed were organized in a marketing cooperative and one of the interviewed mentioned being in an irrigation committee, whereas in the other communities such organizations were non-existent. Aymará was the only community with people mentioning being organized in a women's association (2 of 41).

Female-headed households in the communities of Huayta Corral, Ñuñunhuayo, and Casabamba are not a rare exception (Table 7.3) although they are within the boundaries of the national average (19.5 %; 21.2 % in rural areas). Aymará though with a 24 % of all households headed by women, has a rate almost twice as high as in the other three communities and higher than the departmental average (21.1 %; INEI 2000). Mayer (2002:7) mentions as most important reasons for female-headed households either the death or separation of the husband or his temporary absence due to labor migration. The local schoolteacher in Aymará mentioned men having several households with illegitimate children as the main reason. In the study region, a female-headed household seems to always be an incomplete household. If there is a husband, he will automatically be the official head of the household. In Andean peasant households, male-headed households without a wife do not seem to exist. This is due to the division of work – men are in charge of productive tasks while women administer the resources.

[50] These figures do not take into account the people who are members of the community (*comuneros padronados*), but are not active community members because they are exempted from communal work due to old age or people who have a household in the community but live somewhere else (e.g. Huancayo).

A man simply cannot live alone "[…] because he has no one to cook for him, whereas a lone woman can obtain male help for productive tasks" (Mayer, 2002:7).

Table 7.3 also shows the numbers and percentages of households headed by household heads older than 60 which is, as explained in chapter 6.2.1, another vulnerable group. Furthermore, figures are given concerning the ethnic composition. The poorest villages, Huayta Corral and Aymará, are the ones with the highest percentages of people speaking either only a native idiom or a mixture of Spanish and a native tongue.

Table 7.3: Social characteristics of the participating communities

Characteristics	Huayta Corral	Aymará	Ñuñunhuayo	Casabamba
No. of families	62	95	45	23
Female-headed households	8 (13 %)	23 (24 %)	6 (13 %)	3 (13 %)
Households headed by people older than 60	15 (24 %)	20 (21 %)	3 (7 %)	4 (17 %)
Families speaking a native idiom (Quechua or Huanca)	97 % (31 / 32)	100 % (41 / 41)	3 % (1 / 30)	94 % (16 / 17)

Source: Workshop with community authorities and household survey[51]

As can be seen in Table 7.4, showing the average household composition in the communities, the communities show only slight differences in their household composition in terms of dependency ratios (number of people contributing to the household's finances against numbers of household members) with Aymará ranking best (0.43) followed by Casabamba (0.34), Huayta Corral (0.34) and Ñuñunhuayo (0.26).

There are more under-age children in Ñuñunhuayo and Huayta Corral, than in the other two communities. Concerning the percentage of children going to school there are no significant differences, all communities have a primary school within the village, the quality of which was judged differently, though.

[51] In opposite to the figures relating to female-headed households, and those headed by people older than 60, that were given in the workshop with community authorities, the figures related to language are taken from the household survey that was conducted for the current study.

Table 7.4: Household composition in the communities

	Huayta Corral	Aymará	Ñuñunhuayo	Casabamba
No. of hh members	5.3	4.9	5.3	4.4
No. of people contributing to hh finances	1.8	2.1	1.4	1.5
No. of children (6-18 yrs.)	2.3	1.4	2.9	1.7
No. of children going to school	2.2	1.3	2.5	1.4
Total interviews	32	41	30	17

Source: Household survey

7.2.2 Capital Assets of the Participating Communities

The general asset endowment of the communities that participated in the study can be summed up as follows:

- **Human capital**: Family labor, knowledge of highland cultivation, differing degrees of education and health.
- **Natural capital**: Land (with differences in ownership pattern and quality), livestock (mainly sheep), biodiversity to different degrees.
- **Financial capital**: Limited access to credits, some remittances (10 to 17 % of surveyed households of the different communities).
- **Physical capital**: All communities have electricity; none has a drainage system; except in Casabamba the market access is insufficient (see section on infrastructure below).
- **Social capital**: All communities are *comunidades campesinas* with membership, communal organization and offices, work feasts (*faenas*) and communal work obligations (*ayni*) with differing degrees of endowment with this capital.

However, some differences in asset endowment of the communities did arise (Box 7.1). In the following further information on livestock as a natural asset, on infrastructure as a physical asset and health and sanitation is given:

Livestock

Farmers in all communities own some livestock as natural capital and at least a few small animals (Table 7.5).

Table 7.5: Livestock owned by farmers in the participating communities

	Big sized animals		Medium sized animals		Small sized animals		
	Total	∅	**Total**	∅	**Total**	∅	**Total**
Huayta Corral (n = 32)	213	6.7	903	28.2	272	8.5	1388
Aymará (n = 41)	308	7.5	1285	31.3	559	13.6	2152
Ñuñunhuayo (n = 30)	144	4.8	1062	35.4	270	9.0	1476
Casabamba (n = 17)	66	3.9	226	13.3	108	6.4	400

Source: Household survey

Large animals such as cattle and horses are used as help in the fields or as pack animals; medium animals such as sheep, alpacas, lamas and pigs are kept for their wool and for their meat. Guinea pigs and chicken are considered small animals and provide meat and eggs to farm households.

Infrastructure: Road conditions, market access and facilities for health and education

Huayta Corral is linked with the district capital Acostambo, 20 km away, via an all year round passable gravel road. For reaching the regional wholesale trade center in the provincial capital Huancayo, one has to travel about 20 km on an all year round passable gravel road to the well-conditioned highway Huancayo-Ayacucho. On this highway it is another 40 km to the city center of Huancayo. There are a primary school and a health post in the village. The next secondary school is in Acostambo.

Aymará is linked up with the district capital Pazos, 6 km away, through an all year round passable gravel road. One can also reach Pazos via a 40 min walking trail. From Pazos a well-conditioned, asphalted road heads to the 30 km away Huancayo, which is the regional wholesale trade center. There is a primary school in the village. The next secondary school is in Pazos. The nearest health center is located in Pazos, as well. Road conditions and market access were said to have improved due to government maintenance of roads.

Ñuñunhuayo has a primary school within and a secondary school in the adjoining village 4 km away. There are no means of public transport. Ñuñunhuayo is linked up with a 5 km all year round gravel road to the city of Concepción. From there a good conditioned, asphalted road leads to Jauja, which is 15 km away and is the regional wholesale trade center.

Casabamba is linked through a 15 km all year-round gravel road to the district capital Cullhuas. Another 4 km all year-round gravel road connects the community with the main, well-conditioned highway to Huancayo, 30 km away, which is the regional wholesale trade center. The community has by far the best market access and regular transport service. There is a primary school in the village. The next secondary school is in Cullhuas. The health post is located in the adjoining community, 4 km away.

Health and sanitation[52]

Health points were found within the communities or at least close to them. For example, Huayta Corral has its own health post, which is permanently staffed with one nurse. The health center in Pazos is in charge of Aymará and sends one of its nurses to the community once a month. The nearest health center responsible for Ñuñunhuayo citizens is situated in Masma Chicche, a 2.5 hour walk from the community. It is staffed with four nurses; one nurse visits the community one to two times per month. The health post responsible for Casabamba (situated in the adjoining community) was staffed with one nurse's aid.

The health staff reported that most people come to the health posts during the cold and rainy months when diseases are more prevalent. The health problems that occur most frequently are respiratory infections, colds, bronchitis rhinopharyngitis, and also but seldom pneumonia. Another factor contributing to the prevalence of the above-mentioned diseases were said to be dust and cooking with wood and dung. The latter also causes infection of eyes (e.g. trachoma). Lack of clean water and unhygienic standards, especially the lack of drainage systems in the communities, as well as unhealthy dietary habits (almost exclusively carbohydrates, irregular meals), were said to be reasons for

[52] The information about the health and sanitation situation of the communities was gathered in interviews with health post staff. It therefore includes personal perceptions and estimates.

abdominal colic and diarrheas among community members. Parasite infections also contributed to widespread malnutrition in children and adults. Furthermore, skin fungi, impetigo and scabies were problems among children, due to poor hygienic standards. Cirrhosis was said to be a major health problem among adults in Aymará because of widespread alcoholism.

The average birth weight in three communities was reported to range between 2500-3200g. Casabamba was an exception, with birth weights in this community lower (1800-2000 g), this being caused mainly by malnourished mothers. In comparison to the situation 15 years ago, infant mortality declined. In the last 15 years, a total of three babies died after birth in Huayta Corral and Aymará. No cases of mortality were recorded in children under the age of five. Malnourishment in babies after breast feeding is high in all communities and the share varies between 50-90 % of all children.

While in Ñuñunhuayo the last case of maternal mortality had been five years ago, in no other community maternal deaths were reported by health staff in the last 15 years. However, all interviewed nurses stated that mothers and also their babies are often badly fed. Interest in health issues, such as vaccinations and checkups, but also in reunions and training is high, especially in Aymará and Casabamba. Mothers in general were said to take less care of themselves than men. One-sided, starchy diets (too much potato and too little proteins) and a resistance against changing consumption habits were said to be wide-spread. Furthermore, shame was mentioned as reason for keeping women away from the health point. In all communities, lack of iodine in children and mothers is less of a problem, because children and lactating mothers get enriched foods free of charge and iodine enriched salt is used.

Box 7.1: Capital assets in the communities that participated in the study

Huayta Corral **Human capital:** Knowledge of *maca* cultivation, some education **Natural capital:** 1276 ha land, about 650 ha of which is pasture, which is not suitable for cropping, medium fertile "*tierras negras*", which are likely to be forms of Rendzinas and initial Chernozems, livestock: sheep and cattle (Table 7.5) **Financial capital:** Partial access to formal / informal credit **Physical capital**: No telephone, radio reception, access to drinking water, for more details on infrastructure see above **Social capital:** Little *ayni* and deterioration of commitment to communal affairs were stated. Agricultural aid by CIP, PRONAMCHCS, FONCODES, CARE, CARITAS	**Aymará** **Human capital:** Higher education (of 41 interviewed 22 finalized secondary school, 3 were female, 1 higher education: female) **Natural capital:** 1282 ha land; soil fertility of arable land rated low to medium by community authorities due to high acidity of the soils **Financial capital:** Access to formal / informal credit, remittances (17 % of the interviewed) **Physical capital:** Telephone, radio reception, no access to drinking water, for more details on infrastructure see above **Social capital:** Well organized, community organization has improved in the last 15 years. Producer association existed. Agricultural aid by CIP, CEPAR, FOVIDA
Ñuñunhuayo **Human capital:** Good health, no villager without some education **Natural capital:** 1200 ha, including rocks and badlands. About 50 % is used as pasture; Fertile black soil (communal land); Biodiversity: many native potato varieties, sheep, some cattle and pigs (Table 7.5) **Financial capital:** Limited access to formal (NGO) and informal credit, some remittances (10 % of households) **Physical capital:** Telephone, radio reception, no public transport only mutual aid in transport, see infrastructure above **Social capital:** Highly organized (communal land ownership, communal decision on pasture use), production committee, marketing cooperation, much mutual aid and trust, CIP and PRONAMCHCS aid, relatively high gender equality	**Casabamba** **Human capital:** Relatively good education (3 secondary, 1 is female; 1 higher education of 17 interviewed); entrepreneurship / off-farm diversification **Natural capital:** 1352 ha land. The productivity of arable land was judged medium fertile due to the high quantity of rocks in upper soil layers and soil erosion; Livestock (mainly sheep, some poultry) **Financial capital:** Access to agricultural and bank credit, remittances (17 % of the interviewed), diversified income sources **Physical capital:** Telephone, no radio reception, no access to drinking water, regular transport service, for more details on infrastructure see above **Social capital:** Protestantism is dominant denomination. TALPUY is the only organization that currently is working in the community.

7.2.3 Vulnerability Context of the Participating Communities

Resource stocks

Community authorities in all communities and most of the interviewed farmers reported, that soil fertility in the past 15 years has deteriorated. Reasons mentioned were erosion, degradation of fields by animals (overgrazing) as well as inappropriate use of chemical fertilizers, shorter fallow periods and at the same time lack of compensation of deprived mineral nutrients. Change of climate was a reason mentioned in Casabamba.

Population density

Huayta Corral: In the last 15 years 20 families moved into the community and none left it for good.

Aymará: In the last 15 years, 30 families moved into the community and 3 left it for good, mainly to look for income opportunities.

Ñuñunhuayo: In the last 15 years 10 families moved into the community and 6 left it. Main reasons for leaving were dislike of the communal work and the wish to own private property. Some were expelled for “laziness”.

Casabamba: In the last 15 years three families moved into the community and 15 left it for good, proximity to Huancayo (study and work opportunities) and the lack of water in the community were mentioned as reasons. Some people live and work in the city but retain their fields, stay *comuneros* and participate in communal affairs like *faenas*.

Technology

Huayta Corral: The introduction of *maca* by CARE and processing aid by PRONAMCHCS were said to have increased community’s revenues. Ox-driven plough and tractor (rented by community since 1997) are used.

Aymará: Introduction of new (native) potato varieties by CIP. Community was negotiating with an enterprise concerning the processing of potatoes. Tractors are used (communally).

Ñuñunhuayo: The introduction of new varieties of potato by CIP and aid in fertilizers by PRONAMCHCS was mentioned to have increased communities' revenues. There is a reforestation project introduced by PRONAMCHCS.

Casabamba: Means of transport, equipment for handicraft production and varied businesses.

Economics

Huayta Corral: Increased production of potato was mentioned to have increased revenues. Low prices for livestock products and potato were mentioned as problems.

Aymará: Increased production of potato was mentioned to have increased revenues. Low prices for livestock products and potato were mentioned as problems.

Ñuñunhuayo: Low prices for livestock products and potato were mentioned as problems. Some people are artisans, and some musicians.

Casabamba: Low prices for potato, less demand and high input prices were mentioned as problems. Artisanship, business in grains, livestock, and other trades are practiced; some people are musicians.

Climate

Huayta Corral: Community authorities mentioned weather with the lack of rainfall (5 times), hail (2 times), and frost (2 times), as having the most negative impact on crop production in the past 15 years.

Aymará: Sudden frosts and snowfalls in the vegetation period (every other year) and occasional droughts were the most critical weather extremes for crop production.

Ñuñunhuayo: Frequent droughts (every January / February), hail (same time), and frosts (every other year in January) were said to be a (increasing) problem.

Casabamba: Sudden frost or snow (every other year), lack of rainfall (almost every year) and hail (every year).

Conflict

Aymará: Aymará was the community with the highest percentage of female-headed households (24 %), which according to the local schoolteacher was due to polygamy. [53] It can be assumed, that this could be a source of conflicts.

Ñuñunhuayo: There seemed to be a problem with community members who would like to own private property and to be allowed more entrepreneurship (the communal ownership of land was mentioned as reason for remaining poor by three community members, and some had left the community for that reason).

Huayta Corral and Casabamba: no information

Culture

Huayta Corral: Participation in communal affairs was said to have gone down in the last 15 years (because of egoism), and only a little *ayni* was still practiced. At the same time, the alimentary situation was said to have improved because of better organization.

Aymará was the only community, where participation in communal affairs was said to have improved in the last 15 years (because of better organization). *Faenas* and *ayni* were practiced. All work steps of the agricultural cycle were done communally (including the use of tractors and partially storage of *chuño*[54]). At the same time, the alimentary situation was said to have improved because of better organization.

Ñuñunhuayo: The striking characteristic was the importance of communal organization (9.1), the communal property of land and the way, people dealt with each other. Division of work between the sexes was more equal than in the other communities. Mutual help was mentioned as being a reason for maintaining well-being, but lack of private ownership was also mentioned as reason for not being able to accumulate wealth.

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[53] It was also the only community with women being organized in a women's association, and the community with the best-educated women (3 secondary, 1 higher), but also with 6 women without any education and 14 with non-finished primary education.

[54] *Chuño* is a traditionally conserved native potato of high mountain areas. It is manufactured by exposing it to night frost on the cleared ground and watering it in the morning. This process is repeated for several weeks (Troll, 1968: 32).

Casabamba: The only community where Protestantism was the dominant denomination (11 of 20 community members). Weberian scholars would probably attribute the highly diversified livelihoods and entrepreneurship in the village to this fact. A lot of community members indicated rejection of agricultural aid in the form of capacity building but preferred credit for independent entrepreneurship. Some work steps of the agricultural cycle and *faenas* were done communally (sowing, fertilizer application, *chuño* storage, harvest).

7.3 Village Economics

Every household in the participating communities to some degree depends on agriculture. In other words, each household of the four investigated communities is a farm household.

While the size of the workforce for agricultural tasks primarily depends on the size of the household or family and therefore does not show much variance between the communities, it does show interesting differences concerning the employment of either social obligations or daily labor (Table 7.6). These might be interpreted as indicators for social and financial capital assets in the communities. Even though some of the difference is due to outliers it can still be stated, that Ñuñunhuayo and Aymará not only have the highest labor force employed through *ayni,* but also employ more daily labor.

Table 7.6: Labor force composition in the participating communities

Variable (Means)	Huayta Corral	Aymará	Ñuñunhuayo	Casabamba
No. of workforce: family	2.3	3.2	2.2	2.5
No. of workforce: exchange / *ayni*	2.0	4.5	9.2	2.1
No. of workforce: hired daily labor	5.2	8.4	9.8	2.7
Total interviews	32	41	30	17

Source: Household survey

Diversity of income sources heavily varies between the communities (Table 7.7). For the current study income-diversified farm households (6.4) were predefined as generating more than 10 % of their total income from non-agricultural activities. Such economic activities can be handcrafting, employment in the city, mining, being musician, trading, transport, and others.

While in Ñuñunhuayo 91 % (41 of 45) of households completely rely on practicing agriculture (including livestock breeding), in Casabamba only 43 % (10 of 23) do so. The corresponding percentages for Huayta Corral and Aymará are 79 % (49 of 62) and 83 % (79 of 95), respectively.

Another approach to categorize farm households is to differentiate between production strategies (6.4). For the current study, the boundary between mainly private consumption and market orientation was set at the point of selling more than 30 % of the household's harvest.[55] With the exception of Casabamba (43 %), more than two-thirds of the farm households (Huayta Corral: 79 %; Aymará: 67 %; Ñuñunhuayo: 76 %), besides securing their private consumption, orient their production to the market.

Table 7.7: Income sources and agricultural production strategy of households by community

Community	Number and percentage of households with:									
			Source of income				Agricultural production strategy			
	Total		Agriculture only		Agriculture plus other economic activities		Production mainly for home consumption		Production mainly for market sale	
	No.	%	No.	%	No.	%	No.	%	No.	%
Huayta Corral	62	100	49	79	13	21	13	21	49	79
Aymará	95	100	79	83	16	17	31	33	64	67
Ñuñuhuayo	45	100	41	91	4	9	11	24	34	76
Casabamba	23	100	10	43	13	57	13	57	10	43

Source: Household list

Combining the two ways of distinguishing farm households, some differences between the investigated communities become clear.In Casabamba 77 % (10 of 13) of households, which have diversified income sources, practice agriculture mainly for their private consumption.

[55] At a first glance, this bound might look quite low. Anyhow one has to take in account, that due to the necessity of a household to reproduce its own seeds even 30 % for market sale will mean less than 40 % for private consumption. It can be assumed that from the 30 % bound a shift in strategy of the farm households from the subsistence to market-orientation will take place.

Here agriculture seems to be seen rather a supplementary income source, which frees the household from the dependency of the market, than as the main basis of sustenance (6.4). In contrast, in Huayta Corral (15 % / 2 of 13), Aymará (10 % / 3 of 31) and Ñuñunhuayo (9 % / 1 of 11) only a minority of farm households that mainly produce for private consumption have diversified income sources. In those communities, most subsistence producers have agricultural activities as their main sources of income.

Another issue related to agricultural production is land use. In two communities (Aymará and Ñuñunhuayo), communal rotation / land use is practiced. This means that the rotation is determined by the community and not individually, which allows a comparison of production systems. The presence of a "coordinated agriculture" (Mayer, 1979:78) has profound implications for extension work, because instead of looking for the "innovative farmer" extension services must seek the approval of communities to implement changes in, i.e. seed, varieties, planting dates, rotation and fertilization practices .

Nowadays though, in the communities that participated in the current study, the individual farmers make the cropping decisions. Only Huayta Corral had communal cropping decisions in the past. "Communal lands in Huayta Corral can be divided in those assigned for permanent pasture and for growing crops. Although sectoral fallowing systems seem never to have existed in the village, there has been an intensification of land use as a consequence of human population growth (there used to live only five families in the village in 1975). Land used to be dedicated exclusively to cattle raising and pasture was abundant. A gradual change to crop cultivation has actually reduced the population of cattle and increased the areas of potato and more recently (last five years) *maca*. All those families recognized as "comuneros" by the local village authorities have access right to communal lands which are assigned to families" (De Haan, 2005). Decisions about the use of pasture are made communally in Ñuñunhuayo. The *comunidad* here also allocates one hectare of land every year to each farmer. This determines the land use, soil quality, and rotation pattern for the *comuneros* on these fields. Apart from that, extra land seems to be allocated to some community members. Some own private land, as well. In Aymará communal lands are allocated to community members, as well, but permanently. Consequently, the rotation pattern, crop choice, and so forth is left up to the individual household's decision. Table 7.8 shows the land ownership patterns per community, as reported by the interviewed farmers.

Table 7.8: Land ownership pattern in the participating communities

	Huayta Corral	Aymará	Ñuñunhuayo	Casabamba
Total land (ha / household)	4.6	3.2	2.1	3.0
Private land (%)	28.7	76.4	4.5	82.7
Rented land (%)	8.6	15.6	5.5	7.4
Community land (%)	61.3	2.5	87.8	5.9
Share cropping (%)	0.6	0.0	2.2	4.1
Total interviews	32	41	30	17

Source: Household survey

7.4 Most Important Crops in the Participating Communities

In all four communities native and improved potato are cultivated on most of the arable land (Table 7.9).

Table 7.9: The most important crops in the participating communities

Community	Most important crop		Second important crop		Third important crop	
Huayta Corral	Native potato	29 %	Improved potato	28 %	*Maca*	25 %
Aymará	Improved potato	37 %	Native potato	31 %	Oats	13 %
Ñuñunhuayo	Native potato	53 %	*Ulluco*	18 %	Improved potato	16 %
Casabamba	Native potato	27 %	Improved potato	14 %	Barley	14 %

Source: Household survey

Nevertheless, Andean Roots and Tubers (ARTs) such as *maca* and *ulluco* are also important for the agricultural production. Casabamba is somewhat of an exception: Being placed in the intermediate agro-life zone more favorable climatic conditions allow the cultivation of barley and faba bean here.

7.5 Activities by CIP and NARES in the Participating Communities

The community of **Huayta Corral** received agricultural support from several institutions during the last 15 years (Table 7.10). CIP is currently conducting a participatory assessment of the land use pattern and the biodiversity in the community.[56] At the end of the 1990's PRONAMACHCS conducted projects on forestation and soil improvement in the community. Huayta Corral is characterized by the intervention of several institutions in order to provide technical assistance in *maca* production. The capacity building in *maca* cropping, conducted from 1991 until 1993 by CARE-Peru, was the starting point for *maca* production in larger quantities by many farmers of the community. FONCODES has currently started a project of technical assistance in *maca* production in Huayta Corral that is scheduled to run until 2008. In addition, CARITAS is working with the farmers in order to assist them in livestock breeding and forestation.

Table 7.10: Main activities of institutions in Huayta Corral

Huayta Corral	Type of activities	Time
CIP	Participatory assessment of land use and biodiversity	2005
CARE Peru	Technical assistance for the introduction of *maca*	1991-1993
PRONAMACHCS	Soil improvement and forestation Training for seed selection	1997-2000
CARITAS Peru	Technical help for livestock breeding and forestation	2003-2006
FONCODES	Technical assistance in *maca* production	2005-2008
PRISMA	Agricultural credit	Occasionally
MINAG	Training / workshops	Occasionally
INIEA	Training / workshops	Occasionally

Source: Household survey, local authorities and institutional representatives

During the last 15 years the community of **Aymará** received organizational support from more institutions than any other of the communities that have participated in the study (Table 7.11).

[56] Stef de Haan of the Germplasm Enhancement and Crop Improvement Division is coordinating these activities.

Table 7.11: Main activities of institutions in Aymará

Aymará	Type of activities	Time
CIP	Technical help in integrated pest management in cooperation with INIEA, Training / workshops on fertilizer and pesticide use	Since 1995
	Assistance for the communal gene bank: Multiplication of clean germplasm of native potatoes for evaluation and repatriation, conservation	Since 1998
	Multiplication breeders' seed of advanced clones in virus resistance breeding program	Since 2000
	Participatory selection and multiplication of native potatoes with processing potential; about 34 clones at present, selected from >350; positive selection for seed quality; analysis of stability of yield and quality of native potatoes across 6 environments, for the cooperation with FOVIDA	Since 2004
	Participatory improvement and decentralized production of seeds from Andean crops, in cooperation with INIEA	Since 2003
INIEA	Technical help in integrated pest management in cooperation with CIP	1995
	Assistance in seed production, new seeds / varieties	Since 2003
PRONA-MACHCS	Technical help, new seeds / varieties, training / workshops, micro credit, soil improvement, forestation, sustainable land management, establishment of a conservation committee (inactive today)	1990-2000
FOVIDA	Training / workshops on processing and value adding, in cooperation with CIP	Since 2004
Agrarian bank	Credit	2000
SEPAR	Training / workshops in sustainable land management and potato production	1990-1998
SENASA	Vaccination of large animals	Occasionally
MINAG	Training / workshops	Occasionally

Source: Household survey, local authorities and institutional representatives

Aymará is also the community CIP is working most actively with. Since 1995, CIP has assisted the farmers in pest management (in cooperation with INIEA) and in the use of pesticides and fertilizers. CIP's main intervention in Aymará is the technical advice in the conservation of the local gene bank. Therefore CIP also provides the community with disease free potato varieties, which the community members formerly possessed, but that got lost over the years. Farmers in Aymará also mentioned the support by CIP for establishing market links.

Recently CIP started a joint project with FOVIDA in order to capacitate farmers in the processing of potatoes for the production of chips. Students from the Agrarian University in La Molina, Lima, conduct research activities in Aymará in cooperation with CIP; for example, one study on the evaluation of genetic diversity in native potatoes for micro-nutrient traits and another one on the evaluation of the effect of organic fertilizers on yield and post harvest quality of native potatoes. PRONAMACHCS was very active in Aymará from 1990 until 2000. The support consisted of sustainable land management, micro-credit, technical assistance, and the provision of seeds. Since 2000 the amount of governmental support received decreased.

Since 2003 CIP has supported the community of **Ñuñunhuayo** with technical help in pest management (Table 7.12).

Table 7.12: Main activities of institutions in Ñuñunhuayo

Ñuñunhuayo	Type of activities	When
CIP	Technical help IPM (Andean potato weevil)	Since 2003
	New seeds / varieties Training / workshops Soil improvement	Since 2003
PRONAMACHCS	Technical help, distribution of fertilizers and pesticides, training / workshops Introduction of new seed / improved potato varieties Help in commercialization Micro-credit Soil improvement Forestation	Since 2000
SENASA	Vaccination of large animals	Occasionally
FOVIDA	Training / advice in commercialization	Currently
INIEA	Training / workshops on agricultural production	Occasionally

Source: Household survey, local authorities and institutional representatives

The capacity building by CIP has helped the farmers to better control the pests. In addition, CIP staff in the community conducts several participatory research activities. Farmers received support from the governmental program PRONAMACHCS until the year 2000. PRONAMACHCS provided farmers of the community in Ñuñunhuayo with new potato seeds and assistance in sustainable land management. SENASA supports some farmers occasionally with the vaccination of their livestock. FOVIDA was said to have started to work in Ñuñunhuayo to assist farmers in commercialization.

Casabamba receives little support from organizations today (Table 7.13). The amount of agricultural support was higher in the 1990's. CIP and PRONAMACHCS provided the community with new potato varieties 15 and 10 years ago. The only institution mentioned, that has worked in Casabamba recently, is TALPUY, a small local NGO that gives advice to the farmers in sustainable land management and community organization.

Table 7.13: Main activities of institutions in Casabamba

Casabamba	Type of activities	When
CIP	Provision with new seeds / varieties	1990
PRONAMACHCS	Provision with new seeds / varieties Technical help in sustainable land management Training in agricultural production	1995 – 2001
PRONAA	Financial aid to guarantee price stability for potatoes	1995
TALPUY	Training / workshops in sustainable land management, ecological education, community organization	Currently
INIEA	Training / workshops on agricultural production	Occasionally

Source: Household survey, local authorities and institutional representatives

8 Potato Production in the Participating Communities

Potato cropping is of major importance in the study region as well as generally in the Central Andean Highlands (6.5.1). Total production, yields, and prices are subject to certain fluctuations, caused by weather conditions and farmers' cropping decisions (6.5.2). In Huayta Corral, Aymará, Ñuñunhuayo, and Casabamba most of the arable land is used for potato cropping (7.4). Chapter 8 illustrates how the development of potato production is perceived in the participating communities (8.1)[57]. Furthermore, a description of the farmers in the participating communities of the cropping systems, in which potato is cultivated, is provided (8.2). Finally, findings about the potato storage system, as well as processing and marketing in the participating communities are presented (8.3). The special role potato production plays in livelihood outcomes such as well-being or food security is further analysed in chapter 10.

8.1 Development of Potato Production and Prices

8.1.1 Dynamics of Potato Production

Community authorities were asked about the development of potato production in the last 15 years in their communities (Figure 8.1).

Production of improved and native potato varieties fluctuated significantly over the years (Annex VII). Average productivity in t / ha is higher for improved than for native potato varieties while the community authorities reported that fluctuation in productivity, was more severe for native than for improved potato varieties.

The trend in productivity is going up in all communities but Casabamba. Farmers in Casabamba have rocky fields, the access to water is difficult, and therefore agriculture is an even more demanding task. At the same time farmers in this community are increasingly focused on off-farm activities to gain their living (7.3).

[57] The data presented do not base on a profound agronomic study, but reflect results of the household survey, a workshop with community authorities and expert interviews.

The upward trend of productivity in the other communities is mainly explained by authorities as being caused by the increased use of inputs such as mineral fertilizer and pesticides, mechanization (tractors and animal ploughs) and the introduction of new varieties. Cultivation of the potato crop on virgin territories as well as good weather conditions were mentioned as positive factors influencing potato production.

Figure 8.1: Drawing of the potato life line by community authorities

Furthermore, agricultural support and training sessions purportedly contributed to higher potato production (7.5). Agricultural training by PRONAMACHCS in 2000 especially helped Huayta Corral's peasants to establish a new, more efficient system of seed selection. Additionally, Aymará's president mentioned that training sessions conducted since the 1990's on the improvement of the cropping system, including assistance from SEPAR (since 1993) and PRONAMACHCS (since 1994) in the community helped to increase yields. Especially in Ñuñunhuayo, yields increased significantly after the year 2000 when PRONAMACHCS started its work in this community and initiated the use of improved potato seed, especially of the *Yungay* variety. In addition, PRONAMACHCS introduced other native varieties such as *Peruanita*, which are

good for commercialization. Peasants received help with fertilizers and pesticides in the same year. In 2002 training and education in integrated pest management was conducted by CIP and had a positive impact on production. In the workshop community leaders of Ñuñunhuayo remarked that especially these training sessions helped peasants to significantly increase their potato production.

Losses of harvest or low productivity caused by extreme weather conditions such as *El Niño* (1992 and 1997) were reported. *El Niño* in 1992 however did not affect Casabamba too much because of the rocky soils that do not store a lot of water. Moreover, droughts and hails in the communities (e.g. in Huayta Corral 1994 and 1995) had a negative impact on the potato production. In Aymará, for instance, the harvest in the cultivation periods of 2000 and 2005 got lost by a drought (Annex VII).

8.1.2 Farmers Cropping Decision in Favor of Potato

Growing more native and / or improved potato varieties, than 15 years ago means that farmers cultivate potato on more land, or – especially in the case of improved potato varieties – more intensively. This especially refers to mineral fertilizers, pesticides, and mechanization. The interviewed community authorities stated that farmers could not extend the area under cultivation significantly because the chances of acquiring more land are limited due to the fact that virgin territories are no longer available. Native and improved potatoes for home consumption are produced less intensively since agricultural inputs are expensive and farmers only have a small budget to purchase inputs. Farmers decide to cultivate on more parts of their land potato mainly because they want to bring larger quantities of potato to market or have a higher demand of this staple food within the family (Figure 8.3).

Larger quantities of native and / or improved potato varieties are mainly grown because of better prices for these crops, reported the interviewed farmers. While prices are generally low for both, native and improved potato varieties, some varieties are high in demand, good for selling and hence receive good prices (e.g. among the native potato varieties *Peruanita*, *Amarilla crespa* and among the improved varieties *Yungay* and *Andina* were mentioned by interviewed farmers). This of course is an incentive for some farmers to cultivate more of these varieties.

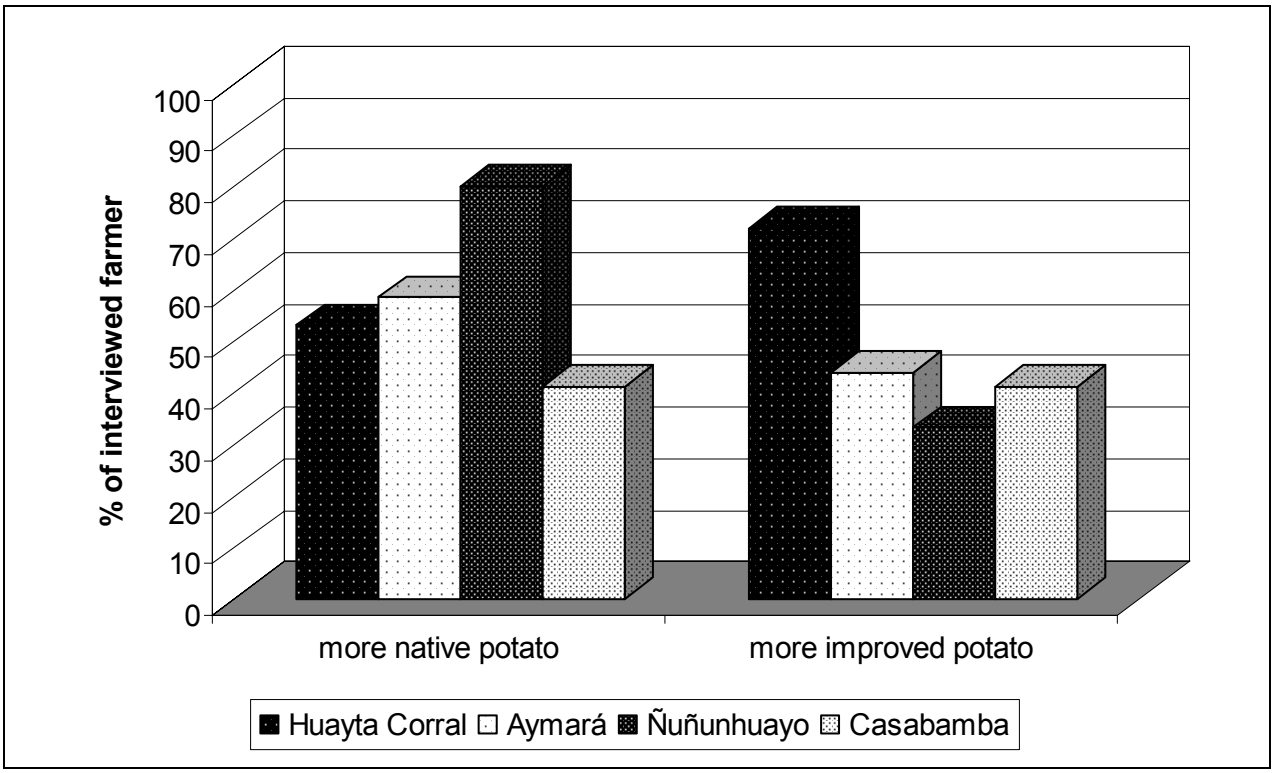

Figure 8.3: Percentage of farmers cultivating more native and / or improved potato varieties, than 15 years ago (Household Survey)

While in three communities the increased consumption of native potato at home was mentioned as second important reason to cultivate more potato on the farm, only Casabamba's farmers mentioned that they cultivated more native potato to acquire cash to better satisfy basic needs. This reflects the attitude of some of Casabamba's farmers to gain income by off-farm activities and agriculture so as to be independent from food purchases. The second most important reason for peasants in Casabamba is the better price for native potatoes, which reflects the perception of the other community farmers in Casabamba, who still cultivate potato for the sale on the markets.

The importance of potato to food security is reflected in the third most important reason mentioned by the interviewed farmers in all communities to grow more native and improved potato: Potato serves not only as an important food item but also as a product to sell on the markets to buy other items, especially food items to enrich the diet of the family.

8.1.3 Farmers Cropping Decision Against Potato

Compared to Figure 8.3, it comes clear that fewer farmers reported in the household survey to cultivate less native and / or improved potato on their farm nowadays than 15 years ago (Figure 8.4). The decision of farmers in the participating communities to cultivate less native and / or improved potato varieties is mainly linked to financial capital constraints and touches mainly the market oriented cultivation of potato and less the production for family consumption.

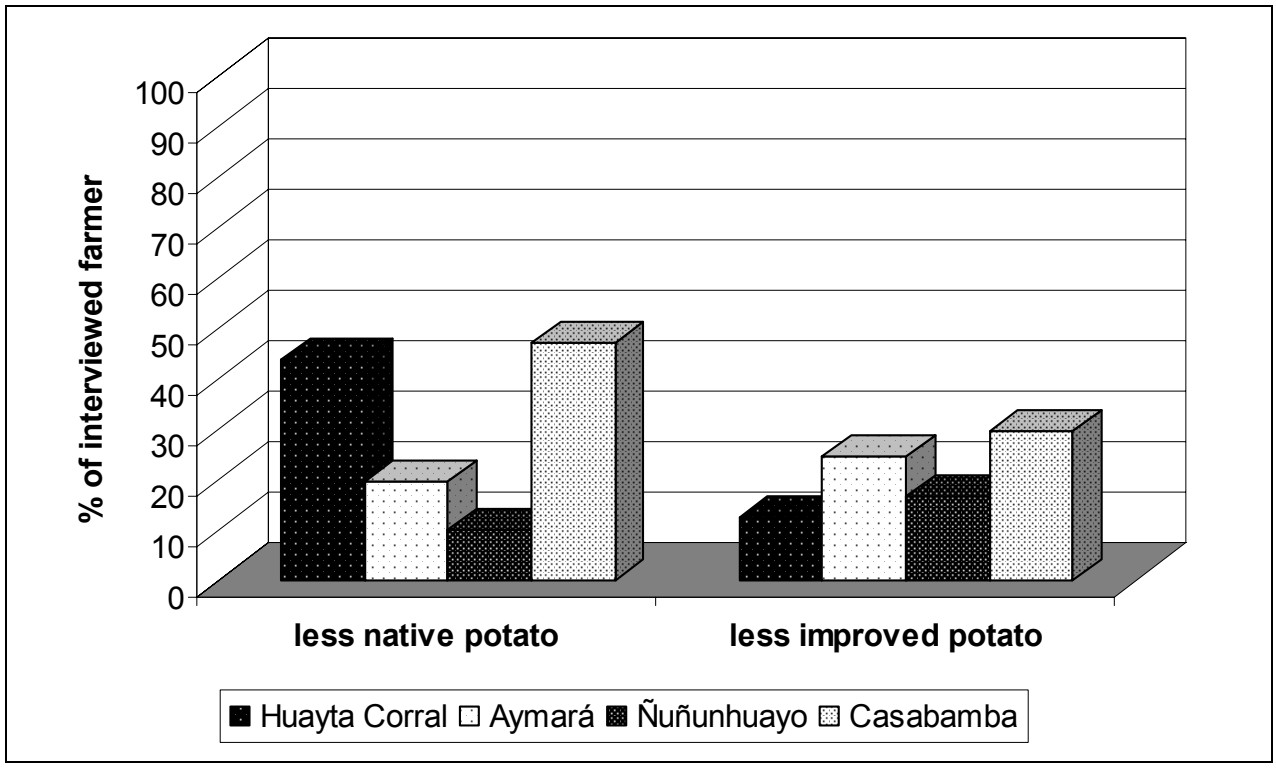

Figure 8.4: Percentage of farmers cultivating less native and / or improved potato varieties, than 15 years ago (Household Survey)

The main reason for cultivating smaller quantities of potato in general and in particular less improved potato are the low prices on markets for this crop. High prices for inputs were reported by farmers to be a major constraint to produce native and improved potato varieties for commercialization.

Farmers, respectively community authorities stated, and the household survey indicated that nowadays farmers face greater problems with pests and diseases in their potato cropping as well as lower soil fertility. These facts call for more agricultural inputs to maintain or increase yields but farmers only have limited financial resources to buy these inputs. Financial resources of small-scale farmers in the Central Highlands depend highly on revenues coming of potato sales. Since prices are low for potato, the revenues are low as well. Therefore

the high costs caused by the increased need of inputs while prices for potatoes are low, hinder farmers to produce the quantities of potatoes they would like to produce.

8.2 The Main Cropping System in the Communities

8.2.1 Elements of the Cropping System in the Communities

The cultivation methods employed for producing the potato crop have major implications for yields and quality of the product. It is important to understand how farmers in the participating communities treat their potato crop, since yields and quality of products have major consequences for incomes and the well-being of the people (10.1.4). The cropping systems described in the current study include the rotation system, irrigation of fields, potato seed supply, mechanization, fertilization, livestock, as well as the management of pests. The data presented in the following pages result from the household survey and transect-walks conducted in the participating communities.

8.2.2 Crop Cultivation

Besides native potato, most of the farmers interviewed in the participating communities cultivate ARTs, improved potato varieties and cereals. Due to altitude and water restrictions, variation in cropping is limited: There is no report, for instance, that any farmer cultivates maize. Even though Casabamba is situated at an altitude of 3800 m a.s.l., many farmers reported that they cultivate peas and faba beans because of the more favorable micro-climate (Figure 8.5).

Irrigation is of major advantage to community members but only few have access to it: Twenty-two percent of the farmers interviewed in **Huayta Corral** have irrigation (7 of 32). Those who have access to irrigation, irrigate up to 30 % while one farmer irrigates 100 % of his land. Those who irrigate are mainly located in the lower parts of the village close to rivers or springs. In the case of **Aymará**, presently 5 % of the farmers (2 of 41) have access to irrigation and merely 5 % in average of their land is irrigated.

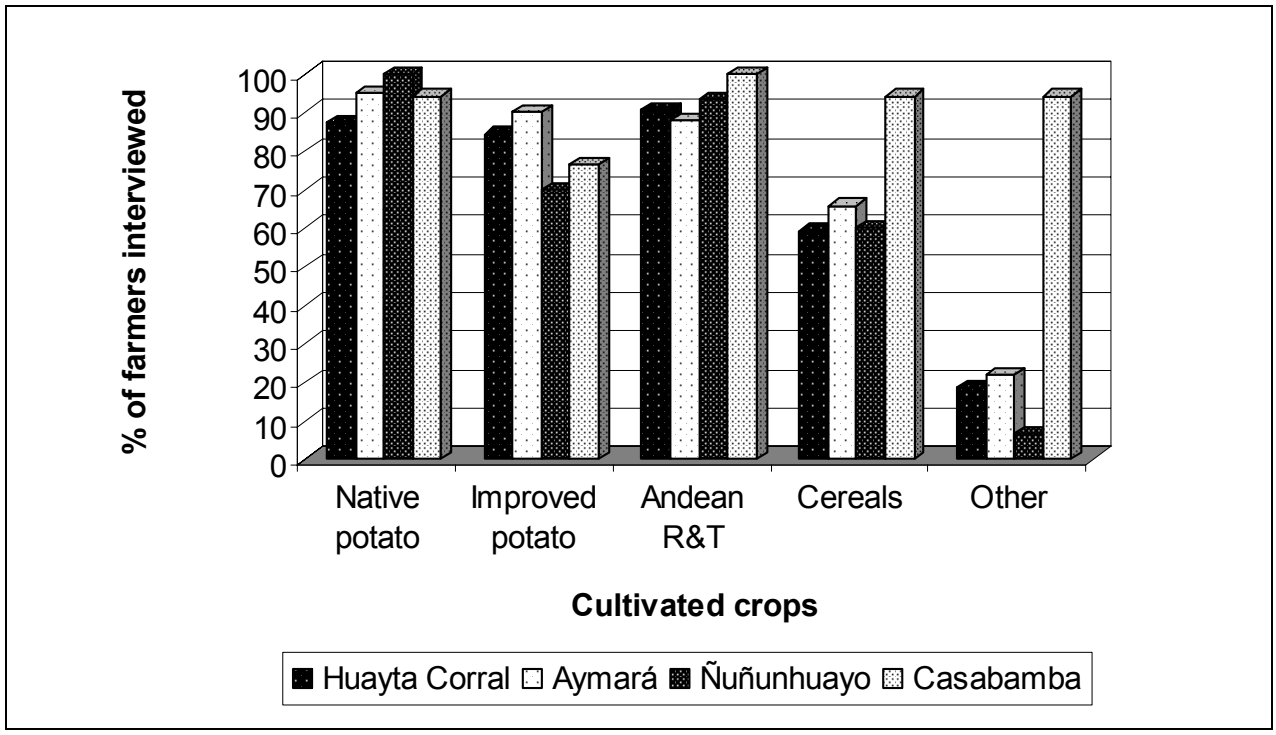

Figure 8.5: Crops cultivated in the participating communities[58] (Household survey)

The situation is similar in **Ñuñunhuayo**: 6 % (2 of 30) have irrigation. These farmers have 20 % and 50 % of their land under irrigation. Access to irrigation in **Casabamba** is not existent. No farmer has land under irrigation and water is extremely scarce even for human consumption. The closest spring is almost an hour by foot away from the center of the village.

8.2.3 Crop Rotation

In the participating communities, planting starts at the earliest at the end of September with the first rainfalls and, depending on the micro-climate conditions, when frosts are less likely. The harvest takes place from March onwards. Potato is cultivated in a certain system of rotation, which differs between communities. (Table 8.1) The detailed rotation systems in the four communities are depicted in Annex VII.

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[58] Native potatoes are varieties of *Solanum tuberosum spp. andigena,* and 6 other native *Solanum spp.* e.g. *phureja etc.* Improved potatoes are varieties of *Solanum tuberosum spp. tuberosum*. Andean Roots and Tubers are, for instance, maca (bot.: *Lepidium meyenii*), mashua (bot.: *Tropaeolum tuberosum* Ruiz et Pav.), oca (bot.: *Oxalis tuberosa* M.) and ulluco (bot.: *Ullucus tuberosus* Lozano) (CONDESAN n.d.). The group of cereals includes barley (bot.: *Hordeum vulgare* L.), wheat (bot.: *Triticum aestivum* L.) and oats (bot.: *Avena Sativa* L.).”Other crops” in the figure are primarily peas (bot.: *Pisum sativum* L.) and faba beans (bot.: *Vicia faba* L.) (Franke 1997).

Table 8.1: Crops in rotation with potato and average years of fallow

	Number of crops in rotation with potato		Years of fallow	
	Today	**15 years ago**	**Today**	**15 years ago**
Huayta Corral	4	2	4.5	4
Aymará	3	2	4	7
Ñuñunhuayo	3 (native) 2 (improved)	1	3 (native) 7 (improved)	7 (native)
Casabamba	3	3	0	2.5

Source: Community authorities

Farmers in **Huayta Corral** today cultivate not only native potato, but newly introduced improved potato varieties, as well as *maca*. Potato crop is cultivated on fields for two years and followed by ARTs. According to community authorities and farmers, fallow years are today four to five years. Farmers in **Aymará** cultivate potato in the first year of rotation, ARTs, and oats follow. At present, according to the community authorities, farmers keep four years of fallow, whereas 15 years ago they kept seven years. The rotation system in **Ñuñunhuayo** is different for improved and native potato. Native potato varieties are rotated with ARTs, and oats while improved potato varieties are only rotated with oats. Fallow years in both rotation systems decreased significantly: Today only three to five years of fallow are kept in comparison to seven years of fallow 15 years ago. In **Casabamba**, no new crops have been introduced to the rotation system. The major change in this particular community was the reduction of the years of fallow. While keeping fallow for two to three years in the past, nowadays farmers keep a maximum of half a year of fallow.

Comparing the above-mentioned information to the rotation system 15 years ago, it is remarkable that peasants in all four communities changed their rotation. Today farmers crop more diversified which seemed to be facilitated by the introduction of new varieties such as *maca* and improved potato varieties (7.5). Diversification of the cropping system was accompanied by lower fallow years. This was also caused by the following facts:

- Fertilization of fields by using mineral fertilizer,
- Pest management on the use of pesticides,
- Lack of virgin land suitable for cultivation.

However, lowering fallow years due to intensified inputs was reported to cause soil deterioration (10.3).

8.2.4 Varieties and Seed Supply

Farmers in the participating communities cultivate a huge diversity of local native potatoes and furthermore several improved potato varieties (Figure 8.6)[59]. It is remarkable that among the eight most commonly cultivated potatoes only *Yungay* and *Andina* are mentioned as important improved potatoes.

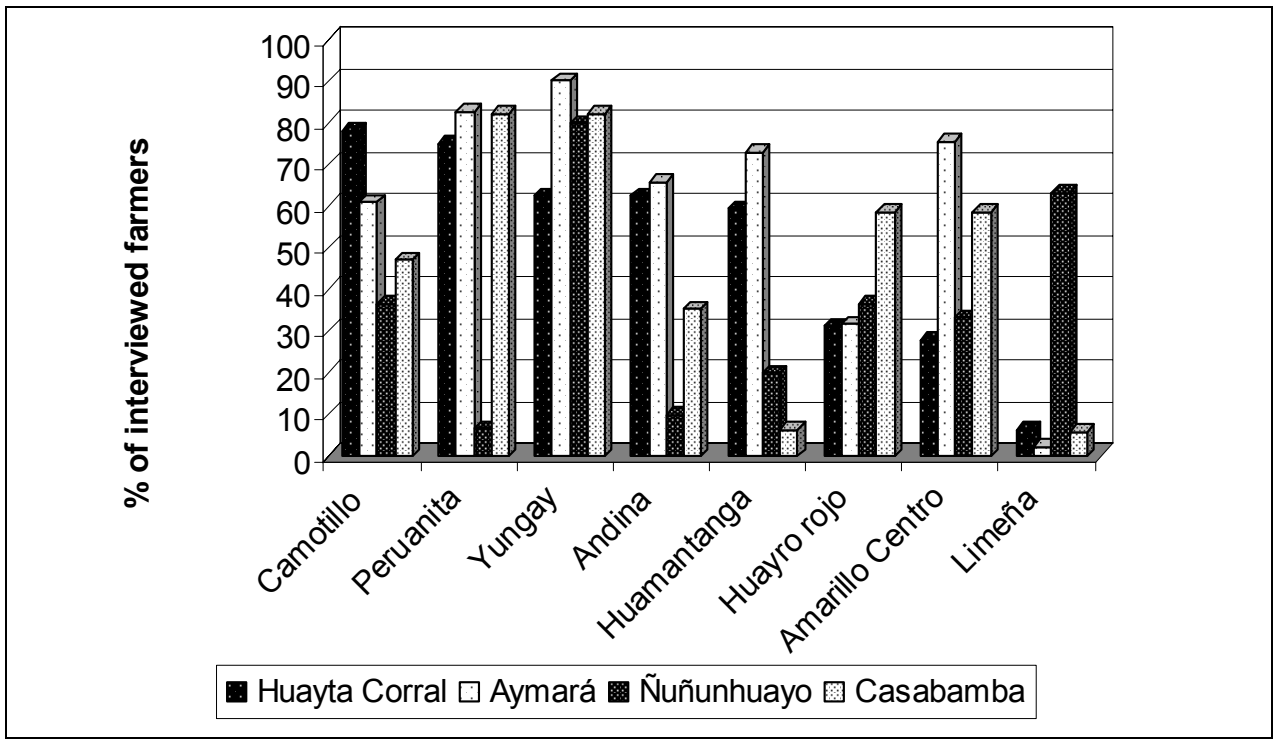

Figure 8.6: Most commonly cultivated potato varieties in the participating communities (Household survey)

Good quality seed tubers are important for improving potato productivity (Thiele, 1999:83ff). Seed tubers in the study region can be replanted for several years without degeneration of tubers and yield reduction because secondary infections by viruses play a minor role in high altitudes. According to Keller (2003:16), however, potatoes can be replanted in the highlands only about three times without considerable yield reductions, since vectors for transmitting viruses in these altitudes are more abundant.

Low financial resources and maybe unawareness of the importance of good quality seed tubers might be reasons that led most farmers in the participating communities to buy new seed seldom or never (Table 8.2).

[59] A detailed list of potato varieties grown in the communities is displayed in Annex VIII.

Table 8.2: New seed purchases in the participating communities during the last 15 years

	Total	0 times		1 to 5 times		5 to 10 times		10 to 15 times		Average (Years)
		Total	%	Total	%	Total	%	Total	%	
Huayta Corral	32	12	38	17	53	2	6	1	3	2.3
Aymará	41	29	71	11	27	0	0	1	2	0.95
Ñuñunhuayo	30	20	67	8	27	1	3	1	3	1.27
Casabamba	17	10	59	7	41	0	0	0	0	0.71

Source: Household survey

Apart from the frequency of purchasing new seed, the origin of seed tubers is of importance. INIEA for example distributes high quality seed potatoes to farmers (Keller, 2003:8) but only few responses referred to INIEA as source of their seeds. Other sources of high quality virus free potato seeds are scarce in Peru since only few potato varieties for sale are certified (Tripp, 1995:6). The main sources of new seeds are other farmers within the community; other communities and the local markets, where peasants purchase especially improved potato varieties.

Farmers in the participating communities do not change their seed in the frequency recommended to maintain potato yields (Keller, 2003). However, peasants select and exchange seed rather traditionally than buy seed tubers. Since these seed tubers are probably not virus free, this can lead to lower yields and is an explanation of diminishing returns for potato producers. On the other hand, good seed plays a crucial role to increase yields. Community authorities reported about the good effects when e.g. PRONAMACHS introduced new varieties in the communities by providing seed tubers or helped establishing a better seed management in Huayta Corral and Ñuñunhuayo (8.1).

8.2.5 Mechanization

Soil management is another factor influencing yields of the potato crop. In the four communities, this is either accomplished manually with traditional tools such as *chaquitajllia*[60], with a plough and animals or with a tractor. While for soil preparation and sowing technical equipment is commonly used (Figure 8.7), for

[60] A *chaquitajllia* (foot plough) is a traditional instrument for tilling the soil (cover picture).

hilling, weeding, and harvest traditional utensils are the choice. The extreme geomorphologic conditions, small parcels of land and restricted financial assets of farmers in the Central Highlands of Peru are the main reason for the prevailing use of traditional tools and the limited use of tractors. Traditional agricultural appliances such as *chaquitajllia* and other tools are more adequate instruments for the treatment of the soil, even though this means the farmers have much more manual labor. Furthermore, the soil in the highlands is very sensitive and the use of a tractor can cause soil erosion and lower the fertility because of compacting soils.

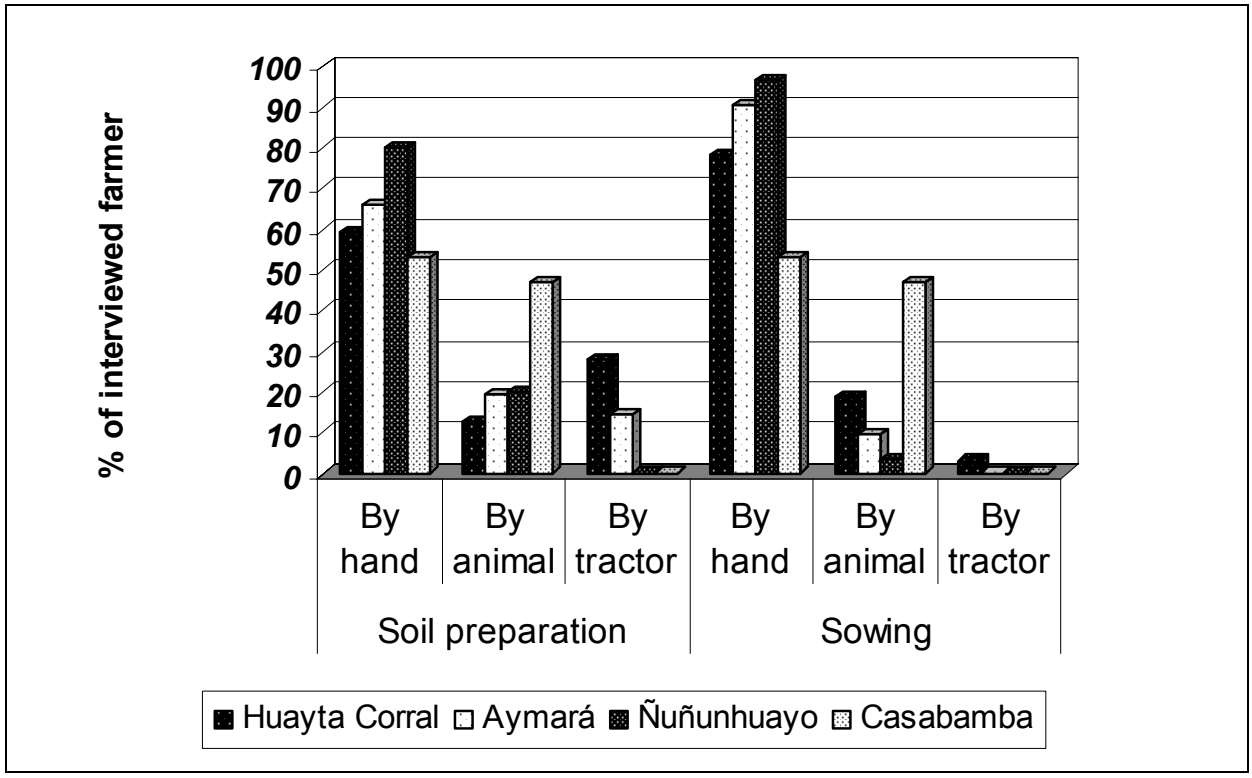

Figure 8.7: Mechanization in potato production (Household survey)

8.2.6 Fertilization

Another factor influencing yields and quality of the potato crop is the use of fertilizer. Organic and mineral fertilizers are used in all communities and 99 % of the interviewed farmers apply them on their fields. [61]

In the Andes, phosphates are considered to be the most important fertilizer for the potato crop (Keller, 2003), which is reflected in the results of the survey.

[61] The following figures are estimates by the interviewed farmers and should be considered accordingly. The farmers faced great problems quantifying the amounts of used fertilizers.

Phosphate was mentioned in all communities frequently and was mostly mentioned to be the main fertilizer. An average between 100 and 230 kg / ha are applied by the interviewed farmers.

In the case of potatoes, besides minerals such as nitrogen and phosphate, especially potassium, mostly applied as a mineral fertilizer, is important. Potassium compensates nutrient removal and contributes significantly to starch production and therefore quality of potato tubers, particularly when applied as sulfate anion. However, farmers in the participating communities only mentioned the use of KCl (30 – 55 kg / ha). This form of potassium also helps tubers to develop properly but includes the danger of contributing to soil deterioration because of its chlorine content. Moreover, the interviewed farmers are using nitrogen in the forms of urea (40 – 80 kg / ha), and ammonium (60 – 75 kg / ha). NPK fertilizer, a composition of three minerals was reported by the farmers to be applied in amounts of 45 to 245 kg / ha on their fields.

Regarding the organic fertilizers used in the communities, the most important one is *guano*; between 540 to 1300 kg / ha are used. Chicken dung and, particularly, compost play a minor role; these fertilizers are used by few farmers and in lower quantities (260 – 380 kg / ha). For small-scale farmers, the fertilization with livestock dung plays an especially important role. Fields are fertilized by *majeo*, which is the traditional manner of sending livestock to fields where they leave their excrements during grazing.

8.2.7 Pest Management

According to the perception of the farmers, four pests and diseases are considered to be most prevalent in all four communities (Table 8.3). For farmers it is important to control them in their potato cropping, otherwise yields decrease significantly or whole harvests get lost. Therefore, fungicides and insecticides are used in all communities by 96 % (115 of 120) of the farmers interviewed. According to community authorities, more inputs are utilized for the market oriented potato production than for the production for home consumption.

A wide range of different fungicides is utilized by farmers in the participating communities (Table 8.4) and is mainly applied to control late blight. Fungicides are applied two to three times during the cultivation period.

Table 8.3: Most important pests and diseases in the participating communities[62]

	Andean Potato Weevil		Late blight		Wart		Potato Tuber Moth	
	total	%	total	%	Total	%	total	%
Huayta Corral	32	100	29	91	4	13	5	16
Aymará	41	100	31	76	6	15	2	5
Ñuñunhuayo	30	100	30	100	0	0	4	13
Casabamba	17	100	11	65	5	30	4	24
Total	120	100	101	84	15	13	15	13

Source: Household survey

It is surprising, that in Casabamba 10 of 17 farmers (59 %) did not report to combat late blight by using fungicides even though 65 % (11 of 17) of the farmers declared this disease to be a major problem in their potato crop. The situation is similar in Aymará, just 12 of 41 farmers combat *Phytophtora infestans* while 76 % (31 of 41) rate this disease an important problem on their farm.

Table 8.4: Most commonly used fungicides in the participating communities

	Huayta Corral (n=32)		Aymará (n=41)		Ñuñunhuayo (n=30)		Casabamba (n=17)	
	Total	%	Total.	%	Total	%	Total	%
Antracol (Propineb)	0	0	1	2	5	17	1	6
Brestan (Triphenyl-zinnchlorid)	4	13	0	0	1	3	0	0
Dithane (Mancozeb)	0	0	4	10	3	10	1	6
Fitoraz (Probineb and Al-Fosetyl)	9	28	12	29	14	47	3	18
Ridomil (Mancozeb and Metalaxyl)	6	19	3	7	1	3	1	6

Source: Household Survey

Farmers apply various insecticides two to three times during the cultivation period to mainly combat Andean potato weevil and potato tuber moth (Table 8.5).

[62] Andean potato weevil (*Premnotrypes suturicallus*); Potato tuber moth (*Phthorimaea operculella* and *Symmestrichema tangolias*); Wart is a potato disease caused by *synchitrium endobioticum.*

Table 8.5: Most commonly used insecticides in the participating communities

	Huayta Corral (n=32)		Aymará (n=41)		Ñuñunhuayo (n=30)		Casabamba (n=17)	
	Total	**%**	**Total**	**%**	**Total**	**%**	**Total**	**%**
Carbofor (Carbofuran)	0	0	0	0	5	17	0	0
Furadan (Carbofuran)	23	72	31	76	19	63	3	18
Laser (Methame)	0	0	1	2	0	0	3	18
Regent (Fipronil)	0	0	1	2	5	17	2	12
Sherpa (Cipermetrin)	1	3	1	2	1	3	5	29
Tamaron (Methamidophos)	8	25	7	17	0	0	0	0

Source: Household survey

Pesticides are available in shops all over the Mantaro Valley without any restrictions (Keller, 2003:13) and, as mentioned above, farmers do make use of these offers. Therefore, lack of pesticides can not explain average or low yields in the communities. Low yields might be explained by inadequate use of these chemical products, but in order to draw a conclusion on this issue a detailed study on the amount of used pesticides would be necessary.

Besides the use of chemicals, which have the major disadvantage of high costs for small-scale farmers and lower effectiveness, farmers know of other methods of insect control for the potato crop. However, these alternative methods are used less than chemical solutions. In Huayta Corral, five farmers of 32 (16 %) use herbs[63], and 8 farmers (25 %) use *biol*[64].

In Aymará, just one of 41 farmers uses traps (2 %), 17 % (7 of 41) use herbs; three farmers manage pests by collecting vermin by hand (7 %). On the other

[63] These special herbs are e.g. *muña (bot.: Minthostachis mellis), tarwi (bot.: Lupinus mutabilis), ichu (bot.: Stipa bomani), aji (bot.: Capsicum annuum)* and garlic (bot.: *Allium sativum* L.). They generally grow in these highland communities.

[64] *Biol* is not directly harmful to pests but serves as a repellent against certain insects. It supports inducted resistance of plants and contains certain minerals that help plants to develop properly.

hand, in Ñuñunhuayo alternative methods of pest control are quite popular: 73 % (22 of 30) use traps, 7 % (2 farmers) control pests by collecting insects by hand. Three farmers (10 %) manage pests and diseases with special herbs. Other methods of pest control are practiced in Casabamba: Five of 17 farmers apply herbs (29 %) and one farmer uses traps (6 %).

8.3 Storage, Processing and Marketing of Potato

8.3.1 Storage of Potato

Storing, processing, and marketing are crucial elements in the production chain. They connect small farmers' potato production and income generation or well-being, respectively. Local storage and processing facilities have the potential to increase income and to buffer the effects of price fluctuations to farmers.

Confirming the observations of Rhoades et al. (1988: 39-43), in the Mantaro Valley three major tasks of potato storage can be distinguished:

- Guarding potato seed until next campaign,
- Storing potato for family consumption,
- Storing potato for later sale.

Since potato is the staple food of all farmers in the participating communities (10.2), storage of potato seed and for family consumption is literally vital. This is underlined by the fact, that all interviewed farmers reported, that currently storage of seed potato and for family consumption is in individual responsibility of each household (Box 6.2). Storage of potato for later sale plays a minor role in the participating communities. This was reported to be due to dehydration losses in the weight of potato, which counteracts the desired increase in income. A special case is the long-term conservation and storage as *chuño* (8.3.2). Storage of *chuño* is partly done communally in Aymará and Ñuñunhuayo.

Potato tuber is a living organism with high water content. Therefore it requires a specific storage system. Storage time of seed potato in the participating communities depends on the potato variety and on the agro-life zone, i.e. the cropping calendar. However, it is not less than four months. The main harvest season is reported to start between March / April and lasts until May / June. Planting lasts from September until December. Storage for home consumption has to be suitable to conserve potatoes until the next harvest of early maturing varieties becomes available. Average storage time of potato for family

consumption in the intermediate and high agro-life zone is six to seven months. The majority of interviewed farmers use traditional storage methods, both for potato seed and family consumption. Only one farmer in Ñuñunhuayo responded, to store his seed potato according to the "diffused light storage principle"[65]. Generally, the potato seed is stored in dark or semi-dark stores or inside houses. Inside stores seed is separated by variety, size and harvest time so that they can be easily recognized (Rhoades et al., 1988:39). The most common types of seed potato storage throughout the four communities are:

- *Costales,* i.e. in sacks of 80 to 140 kg (57 of 120),
- *Trojas*, i.e. seed is piled in small bins (39 of 120),
- *Tarimas,* i.e. seed is placed on platforms (13 of 120),
- *Ruma*, i.e. hills of seed potato on the floor (6 of 120).

Although mentioned by only 28 % of interviewed farmers (42 of 148)[66], both for potato seed and consumption, *ichu* (bot.: *stipa bomani*) is commonly used as a traditional insect repellent[67] in storage. There were no reports of the use of chemical pesticides in storage. In the storage for consumption potato, absence of light is very important, as greened potatoes become inedible.

In the four participating communities as main storage types were mentioned:

- *Trojas* (94 of 148),
- *Terrados* or *atillos*, i.e. platforms in short distance to the roof (30 of 148).

Due to the high altitude of the participating communities, the potato tuber moth does not seem to be a major constraint to potato storage[68]. Only 15 of 120 farmers mentioned this pest as being relevant. Losses such as caused by rapid growth of sprout or fouling, though, were mentioned by almost all interviewed households throughout the participating communities. Most farmers mentioned an average loss of stored seed potato between 0 – 5 % (64 %, 77 of 120). A further considerable number of farmers mentioned higher losses of 10 to 20 %

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[65] The "diffused light technique" is a simple inexpensive way to adjust traditional seed storage to the special demands of improved varieties in the interandean valleys. It helps to reduce sprouting and improves the maintenance of tuber quality (Rhoades, 1988: 42).

[66] Total number of responses.

[67] The 120 interviewed farmers had the possibility to give up to 2 answers.

[68] According to Keller (2003:14) at altitudes of more than 3.800 m, the climate in the Mantaro Valley is too cold for massive occurrence of the potato tuber moth (PTM). In lower zones, the entire stored potato stock can be destroyed by PTM.

(29 %, 35 of 120). Only three farmers reported extreme losses of 40 to 60 % (2.5 %, 3 of 120)[69]. The figures for potatoes stored for family consumption are similar. Inappropriate handling of spoiled potatoes can lead to reproduction and spread of pests and diseases. In the four participating communities, 84 % of farmers (101 of 120) use spoiled potatoes as animal fodder. Nine farmers (8 %) respectively responded that they "throw them away". The others stated they would either eat them anyway or make *chuño* from them.

8.3.2 Processing and Marketing

The globalization process requires that also in a developing country as Peru, the agro-food systems have to become modernized and strengthened. In this context, also small farmer market linkages need to be improved. The main challenge is to respond to new market requirements with innovative (processed) and high quality products (Devaux et al., 2005:5).

Even though it was reported that with the support of FOVIDA in Aymará the installation of a potato drying facility was planned, at present in none of the four participating communities processing facilities can be found. The only processing activity practiced, is the production of *chuño*. About one-third (39 of 120) of the interviewed farmers in the participating communities responded to produce this conserved potato. An exception is Casabamba, where only 12 % of farmers (2 of 17) were mentioned to do so. This was explained by the community's lack of water. The production of *chuño* was reported to have two main aims:

- Conservation for own consumption,
- Value adding for market sale.

The Peru-wide potato price is characterized by seasonal and annual fluctuations (6.5.2). According to the perception of the community authorities, potato prices for small-scale farmers fluctuate heavily for several reasons. Since taxes on agricultural inputs were removed under the Fujimori government, community authorities pointed out that overproduction and therefore low prices occur more frequently. As another influencing factor for prices, they condidered the fact that Peru recently allowed potato imports (Box 8.1)

[69] Those were probably biased by recent shock events or by the difficulty of expressing the actual loss. It is not likely that a small farming household in the study region can cope with frequent losses at such a high level.

However, the price a farmer after all fetches heavily depends on where he gets the price information from and to what market he has access.

Only a minority of 9 % of interviewed farmers (8 of 93) stated to inform themselves about potato prices in advance by radio or the MINAG. Twenty percent (19 of 93) stated to get their price information from other farmers, whereas the majority of 71 % of farmers (66 of 93) stated to get their price information at the market or from the intermediary, just when selling their potatoes. These farmers are doomed to sell their potato at any price offered by the market or intermediary, respectively. Vakis et al. (2002) indicate that farmers could get a 20 % increase in potato price in the Peruvian Central Highlands if they have access to real market prices (i.e. through the radio), so that they have more bargaining power.

Box 8.1: Do have imports of potato to Peru a negative effect on potato prices?

Many Peruvian small-scale farmers depend heavily on the sales of their potato crop. So prices for this crop are very important to people but prices, as the community authorities reported, were especially low in 2004 / 2005. Community authorities in the four participating communities explained this fact by higher supply of potato on the national market because of imports to Peru.

In 2003, in Peru 3.15 million tons of potatoes were produced. For some North American fast food chains, about 10.000 t of potato of a special variety are imported each year. The imported variety “Atlantis” does not grow in Peru and is characterized by less oxidation during processing. Imports to Peru are approximately 0.32 % of the total national potato production in 2003 and therefore potato imports probably do not significantly influence potato prices on the local and national markets

Source: Valencia, 2005; Malpartida, 2005

In the participating communities about 10 % of interviewed farmers, who produce for market sale (9 of 93) sell their potato to an intermediary in the district capital or directly on field. The majority of 90 % (84 of 93) of farmers sell potato to the wholesaler at the regional markets, which usually is situated in the department capital. Solely in Ñuñunhuayo it was reported, that some farmers jointly organize transport to sell their potato directly to the main national market in Lima. This gives them the chance to sell their potato to significantly higher prices (Table 8.6).

Table 8.6: Prices for native and improved potato in different markets

	Native potato prices per kg				Improved potato prices per kg			
	Wholesaler		Consumer		Wholesaler		Consumer	
	NS	US $	NS	US $	NS	US $	NS	US $
Huancavelica	0.68	0.21	0.80	0.25	0.30	0.09	0.45	0.14
Huancayo	0.53	0.17	0.85	0.27	0.31	0.10	0.45	0.14
Lima	0.98	0.31	1.72	0.54	0.43	0.13	0.67	0.21

Source: Direccion Regional de Agricultura, 2005

Generally Peru-wide the biggest profit goes to intermediaries and wholesalers, who often offer a potato price, which is lower than the production prices of small farmers (Izarra, 2005:64). Those are forced to "sell out" their assets in order to keep their production going (10.3). A main reason for this is the weak position of small farmers in the current market chains. Unorganized small farmers, who are highly dependent on the sale of their harvests, do not have the power to look for better market opportunities. Redistribution of profits to the producer side is vital for small-scale farmers. Market chains have to be modified, to gain benefits for all actors (Figure 8.8). Two principal options for modification are:

- To increase efficiency in the market chain by lowering costs (such as transaction costs), and
- To increase consumer prices by value adding to products and services (Bernet et al., 2005:1).

A promising method to create a platform where all actors of the market chain can jointly find innovative solutions is CIP's Participatory Market Chain Approach (Bernet et al., 2005:5). The MINAG and its regional institutions pursue similar aims[70]. They encourage small farmers to integrate themselves in propagated "production chains"[71] by founding "farmer enterprises". A "production chain" is intended to facilitate the interrelation and articulation of actors in terms of technology and financing under conditions of efficiency, co-operation, and equality (Direccion Promoción Agraria Junín, 2005).

[70] The MINAG vision for the agrarian sector is, to have organized, competitive and profitable agricultural producers, which – in a democratic environment and with equal opportunities – are economically, socially and environmentally sustainable (Direccion Promoción Agraria Junín, 2005).

[71] In a *"cadena productiva"* (production chain) is included "the whole of economic actors, which are interrelated at the market: from the provision of inputs, production, transformation, industrialization, commercialization and at the end to the consumer" (Direccion Promoción Agraria Junín, 2005).

In addition to this, an integration of small farmers in “production chains” is supposed to promote MINAG cultivation recommendations to prevent potato overproduction (Box 6.3).

Aymará is the only participating community, where some farmers got merged to “farmer enterprises” (Valencia, 2005). However, this was reported to weaken the traditional community spirit (Box 6.2). This might be a reason for the conscious reluctance of Ñuñunhuayo’s farmers to found such farmer enterprises.

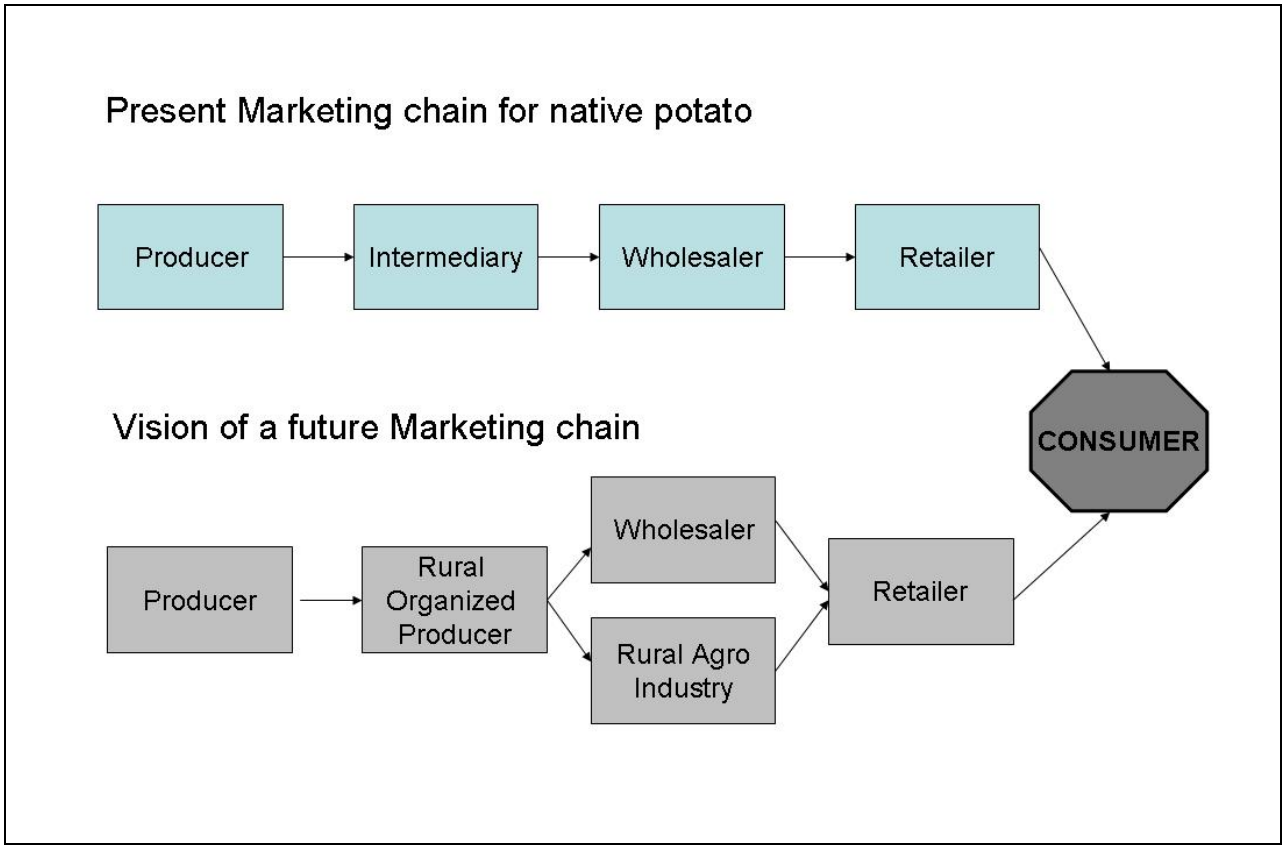

Figure 8.8: Present and future vision of potato market chain according to MINAG (Direccion Regional de Agricultura, Pazos, 2005)

9 The Degree, Dynamics and Causes of Poverty in the Participating Communities

To be able to focus on poverty reduction, a deep and comprehensive understanding of the poverty concept in the participating communities is required. Basing on the conceptual framework on poverty as explained in chapter 4, a set of methods called PAPA was developed in order to capture people's perception of poverty (5). Working with this commonly agreed understanding of poverty (9.1), information on the incidence (9.2), the dynamics (9.3) and the causes of poverty (9.4) were provided by the assembled communities. Based on the Livelihood System Approach, poverty or well-being, respectively was approached from three different perspectives looking at assets, strategies and outcomes. The analysis first concentrates on the asset level and provides findings for the asset endowment of households (9.5). Chapter 9.6 provides further information on how these assets are combined; what strategies households pursue in order to cope with, and adapt to, shocks and trends and ensure certain livelihood outcomes.

9.1 Poverty Perception in the Participating Communities

PAPA has been developed to understand how the people living in the participating communities perceive poverty (5). As part of it in the assembly of each participating community, in a brainstorm, criteria for well-being were defined and discussed. Well-being was defined as the overall outcome of people's livelihoods (4.2).

The mentioned criteria were put into a certain sequence to show the importance ranking as defined by the local population. This allowed drawing the commonly agreed poverty line, that means the cut-off point between poor and non-poor (Figure 9.1).

The placement of the poverty-line, and also the nature of the criteria below this cutoff, did not vary much in all four communities. Some differences did arise in the manner in which different communities ordered these first stages, but still in all communities – among other criteria – basic education, basic health, basic clothing, and basic food were mentioned (Table 9.1 and Table 9.2).

The ordered criteria show a common concept of poverty in the participating communities: As long as people are struggling to meet their basic needs (such as basic education, basic health, basic clothing, basic food) they are considered to be poor. This corresponds to the concept of basic needs, meaning the satisfaction of essential food-, health- and education requirements (4.1). Another definition of poverty just fits perfectly well to the findings in the participating communities: poverty as “the stress to satisfy basic needs” (Armutskonferenz, 2005). After the basic needs are met, in all participating communities the poverty cut off line is drawn, which means that only if the basic needs are satisfied a way out of poverty is possible.

Figure 9.1: Ranked criteria for well-being and poverty line in Huayta Corral (Community Assembly)

After drawing the poverty-line and the division into the two groups – “poor“ and “non-poor” – the assembly was asked to give a further characterization of each of the groups to gain a better understanding of what being poor – and respectively being non-poor – actually means to a family in the community. This characterization gives a first impression of how the endowment and quality of the assets differ in between these two groups – and hence the strategies – and how this on the other hand influences the outcomes of a livelihood. The further analysis captures poverty from these three perspectives. The detailed characterization of every community as displayed in Annex XI shows major similarities between the villages in characterizing poverty.

Just to point out an example for the asset level: Referring to human capital [H] all assembled communities agreed that families belonging to the group of “non-poor” have a better health status (due to a more balanced diet, and access to basic health services, etc.) Meanwhile the health situation of families belonging to the group of “poor” is deficient. An analysis of the asset endowment of households is provided in chapter 9.5.

A closer look at the strategies households pursue shows the differences between the two groups, too: Poor households invest little in livestock. Whether this is due to financial constraints or due to setting of different priorities in decision-making is not the matter of concern here, the fact is that being poor is linked with the possession of less livestock than being non-poor. On strategies that households pursue, such as the above-mentioned investment in livestock, chapters 9.6 and 10.1.1 will provide further information.

Depending on their assets and strategies, poor households attain different livelihood outcomes than non-poor households. Concerning food security as one example, being non-poor is characterized by eating well and balanced while the diet of poor people is rather insufficient. Livelihood outcomes, such as food security, and the role agriculture plays on them, will be explained in chapter 10.

Table 9.1: Importance Ranking[72] and Poverty Line in Huayta Corral and Aymará

	Huayta Corral	Aymará
Non-Poor		
	Access to transport	
	Improved tools	
	Improved breeding of guinea pigs	
	Housing with basic services	
	To retail potato	
	Livestock	
	Possession of cultivation area	
	Good education	Commodities (TV)
	Good diet	Communication (roads, telephone)
	Family planning	Livestock
	Good health	Area of more than 1 ha of fertile soil
	Water	Basic services
Poor	Work (occasional)	Communal organization
	Basic health	Family relations
	Basic education	Basic housing
	Family relations	Some money
	Basic clothing	Work (in agriculture)
	Basic housing	Basic education
	Communal organization	Basic health
	Basic food	Basic food

Source: Community assembly

[72] Bottom line = least important, top line = most important

Table 9.2: Importance Ranking and Poverty Line in Ñuñunhuayo and Casabamba

Ñuñunhuayo	Casabamba	
	Access to transport	Non-poor
	Communication means	
	Have household appliances	
	Services (electricity)	
	Improved health	
	Improved diet	
	Money	
Have access to transport	Access to education / training	
Preserve the environment	Possession of seed	
Good education	Possession of tools	
Good health	Possession of area, forestry	
Good clothing	Livestock	
Good diet	Own housing	
Livestock	Family relations	
Cultivate / Commercialize more	Water	
Housing with basic services	Communal organization	
Raise small animals		Poor
Cultivate potato / Sale in small amounts		
Basic education		
Basic health	Work	
Basic housing	Basic education	
Basic clothing	Basic health	
Basic food	Basic clothing	
Communal organization	Basic food	

Source: Community assembly

9.2 Incidence of Poverty

Referring to the shared understanding of poverty as developed by the community members, each household's status at the present time was identified by the assembled community members. Thus, the villagers classified themselves in terms of well-being. Table 9.3 shows the current incidence of poverty, and presents a headcount of how many households belong to the group of "poor" or "non-poor" respectively.

Table 9.3: Share of households by community being poor or non-poor

	Poor		Non-poor		Not classified		Total	
	No.	%	No.	%	No.	%	No.	%
Huayta Corral	24	39	37	60	0	0	61	100
Aymará	16	17	74	78	4	4	94	100
Ñuñunhuayo	6	13	32	71	7	15	45	100
Casabamba	2	9	18	79	3	13	23	100
Total	48	22	161	72	14	6	223	100

Source: Community assembly

Surprisingly in each community the number of households that are considered to be non-poor is much higher than the number of households that are considered to be poor. Since this number displays the poverty perception of the community members, conclusions about the absolute poverty status in the participating communities should not be drawn from this. Completely different results would be gained by using other approaches and different indicators to assess poverty such as the poverty line methods as applied by the World Bank. According to the indicators used by FONCODES, all the participating communities are poor if not very or extremely poor (4.1.2 and 7.1).

9.3 Dynamics of Poverty

The assembled community groups identified each household's status in terms of poor or non-poor at the present time and 15 years ago. Hence, each household's movement can be differentiated into four different categories of well-being (5.3.4):

- Households that **remained poor (RP)**,
- Households that **escaped poverty (EP)**,
- Households that **became poor (BP)**, and
- Households that **remained non-poor (RNP)**.

After all community households were assigned into these four well-being categories (Table 9.4), a random sample of at least 40 % of each category was drawn (Table 9.5) For these selected households the assembly was asked to provide reasons for the dynamics of each of the selected households' trajectories. The mentioned causes were assigned to the five types of assets: **financial [F], human [H], natural [N], social [S] and physical [P]** (4.2), and followed-up in the household survey (Annex IV). The consistency of the classification as given by the assembly was confirmed by the household survey: 80 % (38 of 47) of the households that were classified by the assembly to have escaped poverty consider their own situation improved. Of households who became poor 89 % (8 of 9) consider their own situation deteriorated. This finding proves the validity of the data.

Table 9.4: Share of households in each category by community

	RP		EP		BP		RNP		Non Classified		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%	No.	%
Huayta Corral	22	35	30	48	2	3	7	11	0	0	62	100
Aymará	11	12	35	37	5	5	39	41	4	4	95	100
Ñuñunhuayo	5	11	19	42	1	2	13	29	7	15	45	100
Casabamba	1	4	2	9	1	4	16	70	3	13	23	100
Total	39	17	86	38	9	4	75	34	14	6	223	100

Source: Community assembly

Table 9.5: Size of sample in each category by community

	RP		EP		BP		RNP		Total	
	No.	%	No.	%	No.	%	No.	%	No.	%
Huayta Corral	9	28	17	53	2	6	4	13	32	100
Aymará	6	15	14	34	5	12	16	39	41	100
Ñuñunhuayo	5	17	14	47	1	3	10	33	30	100
Casabamba	1	6	2	12	1	6	13	76	17	100
Total	21	17	47	39	9	8	43	36	120	100

9.4 Causes for Poverty Dynamics as Mentioned in the Assemblies

9.4.1 Huayta Corral

Main reasons for **remaining poor** in Huayta Corral were related to a lack of financial assets (9 times in total): Input constraints (meaning lack of financial inputs in agriculture) (5 of 9) and lack of financial assets due to maintenance of big family (4 of 9) (Table 9.6). Furthermore, families remained poor due to a lack in human capital (mentioned five times in total) caused by ill health, accidents, physical disability, old age (3 of 5) or loss of partner (2 of 5).

As the factor related to natural capital (two times in total) insufficient land (2 of 2) was mentioned as a reason for remaining poor. Least mentioned for remaining poor was social capital (mentioned one time in total) such as a deficit in unity of family / family organization (1 of 1).

Table 9.6: Main reasons for dynamics as mentioned in the assembly of Huayta Corral[73]

	RP	EP	BP	RNP	
Financial Capital [F]	**9**	7	**2**	1	
Human Capital [H]	5	7	**2**	2	
Natural Capital [N]	2	7	-	-	
Physical Capital [P]	-	4	-	1	
Social Capital [S]	1	9	-	2	
Strategies [STR]	-	**28**	-	**4**	
Total number of reasons	17	62	4	10	93

Source: Community assembly

[73] The table displays the total number of reasons mentioned by category as well as the frequency by reason. Reasons mentioned most often are highlighted.

Reasons mentioned for **escaping poverty** were mostly related to certain strategies a household pursued (mentioned 28 times in total): Agricultural / crop diversification (11 of 28) and / or investment in livestock[74] (9 of 28) as well as investment in potatoes[75] (8 of 28). On asset level causes related to social capital (9 times in total) such as help from friends, family, and others (4 of 9) and unity / organization within the family (2 of 9) were mentioned. Access to institutions in the form of either government support, help from NGO or own political position, were mentioned once each.

Next often mentioned were financial assets (7 times in total), such as access to credit (3 of 7), followed by other income sources such as seasonal (private employment outside the village (2 of 8) and daily work (1 of 8) as well as economic activity of women (1 of 8). As causes related to natural capital (mentioned 7 times in total) sufficient land (3 of 7) and / or introduction of new varieties (3 of 7) were mentioned as well as acquiring extra land for cultivation (1 of 7). Human capital (7 times in total) such as family planning (3 of 7), the ability to work hard (3 of 7) and education (1 of 7) were seen as contributing factors to escape poverty. Physical capital related causes for escaping poverty were mentioned four times in total: Inheritance (3 of 4) and use of improved technologies (1 of 4).

Reasons for **becoming poor** were related to financial capital (mentioned 2 times) such as input constraints (2 of 2) and human capital (mentioned 2 times) such as loss of ability to labor due to illness (1 of 2) and lack of labor force in a household because of being single mother / widowed / divorced (1 of 2).

As reasons for **remaining non-poor** certain strategies were mentioned most frequently (4 times in total) such as investment in livestock (2 of 4) and investment in potato (1 of 4) as well as agricultural / crop diversification (1 of 4). The second most frequently mentioned reason was related to human capital (2 times in total), the ability to work hard and dedicated (2 of 2). Social capital related issues were mentioned 2 times in total and referred to unity / organization of family (2 of 2). As a financial asset, a job / employment outside the city was mentioned once and as a physical asset, market access was also mentioned once.

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[74] Investment in livestock subsumes diversification / intensification / sale of livestock.

[75] Investment in potato subsumes specialization in / intensification / cash cropping of potato.

9.4.2 Aymará

Most reasons mentioned for **remaining poor** were related to financial capital (mentioned 13 times in total) such as high costs / spending due to maintenance of a big family (5 of 13), little income due to daily labor (5 of 13), input constraints for agricultural production (1 of 13), lack of savings (1 of 13) and high spending related to ill health / accident (1 of 13) (Table 9.7). The second most mentioned reasons were related to human capital (mentioned 5 times in total) such as lack of labor force in a household caused by being a single mother / widowed / divorced (4 of 5) and lack of education (1 of 10). Related to natural capital, insufficient land was mentioned (3 of 3) as the main reason for staying poor. The reasons related to social capital (mentioned three times in total) such as lack of unity / organization in the family (2 of 3), which corresponds to no or only a little help from family, friends, and others (1 of 3) were least mentioned.

The causes mentioned most often for **escaping poverty** were related to certain livelihood strategies (19 times in total) pursued by a household such as investment in livestock (11 of 19), agricultural / crop diversification (7 of 19) and investment in potato (1 of 19). The second most mentioned reasons were related to financial capital (mentioned 16 times in total), monetary income from daily work (7 of 16), business / trade (5 of 16), a private job (e.g. seasonal employment outside the village) (2 of 16), and savings (1 of 16) as well as the economic activity of women (1 of 16). Reasons related to human capital were mentioned seven times in total such as the ability to work hard and dedicated (5 of 7), and family planning (2 of 7). Mentioned five times in total are reasons related to natural capital such as acquiring extra land for cultivation (3 of 5) and or the possession of already sufficient land (2 of 5). Reasons related to social capital were mentioned four times in total, such as help from friends, family and others (3 of 4) and unity / organization of family (1 of 4). As reason related to physical capital inheritance was mentioned two times.

Table 9.7: Main reasons for dynamics as mentioned in the assembly of Aymará

	RP	EP	BP	RNP	
Financial Capital [F]	**13**	16	2	6	
Human Capital [H]	5	7	**7**	5	
Natural Capital [N]	3	5	2	4	
Physical Capital [P]	-	2	-	11	
Social Capital [S]	3	4	2	3	
Strategies [STR]	-	**19**	-	**23**	
Total number of reasons	24	53	13	52	142

Source: Community assembly

The reasons mentioned most often for **becoming poor** were related to human capital (7 times in total) such as lack of labor force in a household due to being single mother / divorced / widowed (4 of 7) and inability to work due to illness / accident / physical disability / old age (3 of 7). High spending due to maintenance of a big family is mentioned two times as a reason related to financial assets (2 times in total). As a reason related to natural capital no sufficient land is mentioned two times. Related to social capital (2 times in total) the lack of help from family, friends and other was mentioned two times as a reason or contributing factor of becoming poor.

The reasons mentioned most often for **remaining non-poor** were related to strategies (mentioned 23 times in total) such as investment in livestock (10 of 23), followed by agricultural / crop diversification (9 of 23) and investment in potato (4 of 23). Reasons mentioned the second most were related to physical capital (mentioned 11 times in total) such as inheritance (9 of 11) and access to market (2 of 11). Reasons related to financial capital were mentioned six times in total such as earning an off-farm income trough running an own business / trade (3 of 6), through a private job / seasonal employment outside the village (2 of 6) and / or through selling labor force on a daily base (1 of 6). Related to human capital (mentioned five times in total) the reason mentioned most often was being educated (4 of 5), followed by the ability to work hard and dedicated (1 of 5). Natural capital related reasons for escaping poverty were mentioned four times in total such as owning sufficient land (3 of 4) and acquiring extra land (1 of 4). The reasons mentioned least for escaping poverty were related to social capital (mentioned three times) and refer to help from family, friends, and others (3 of 3).

9.4.3 Ñuñunhuayo

The reasons mentioned most often for **remaining poor** were related to financial assets (mentioned five times in total) such as high spending related to illness / accidents (2 of 5), input constraints (1 of 5), maintenance of a big family (1 of 5); daily labor was mentioned once. The reasons mentioned next most often were related to human capital (mentioned four times in total) such as the inability to work due to ill health / accident / physical disability (2 of 4) and lack of labor force due to being a single mother / widowed / divorced (2 of 4). Related to natural capital (two times in total) insufficient land was mentioned (2 of 2) as a reason for staying poor. A reason related to social capital was mentioned only once: no help from family / friends / others (Table 9.8).

Table 9.8: Main reasons for dynamics as mentioned in the assembly of Ñuñunhuayo

	RP	EP	BP	RNP	
Financial Capital [F]	**5**	8	**1**	5	
Human Capital [H]	4	3	**1**	6	
Natural Capital [N]	2	5	-	1	
Physical Capital [P]	-	3	-	-	
Social Capital [S]	1	8	-	8	
Strategies [STR]	-	**12**	-	**16**	
Total number of reasons	12	39	2	36	89

Source: Community assembly

The reasons mentioned most often for **escaping poverty** were related to livelihood strategies (mentioned 12 times in total) such as investment in livestock (6 of 12), investment in potato (4 of 12) and agricultural / crop diversification (2 of 12). The second most mentioned reasons were linked to social assets (mentioned eight times in total) such as help from family, friends, others (7 of 8) and unity / organization of family (1 of 8). Further reasons mentioned were related to financial capital (total eight times) such as own business / trade (3 of 8), jobs / private employment outside the village (2 of 8) and women's economic activity as an additional income source (1 of 8) as well as access to credit (1 of 8) and daily labor (1 of 8). Reasons related to human capital were mentioned three times in total such as family planning (2 of 3) and the ability to work hard and dedicated (1 of 3).

Least mentioned causes or factors contributing to escape poverty were related to physical assets (mentioned 3 times in total) such as access to market (2 of 3) and inheritances of production means (1 of 3).

Households **became poor** because of reasons related to human capital (mentioned once): lack of labor force in a household because of being single mother / divorced / widowed accompanied with high costs because of maintenance of a big family (financial assets, mentioned once).

The reasons mentioned most often as to why households **remain non-poor** are related to strategies (mentioned 16 times in total) such as investment in livestock (10 of 16), and investment in potato (6 of 16). The next most mentioned reasons were related to social capital (8 times mentioned in total) such as help from families / friends and others (6 of 8), and unity / organization of family (2 of 8). The third often mentioned reasons were related to human capital (6 in total): The ability to work hard and to be dedicated (5 of 6), family planning as a reason to rise of poverty is mentioned once. Reasons related to financial capital are mentioned five times in total: extra income derived from business / trade (2 of 5), and job / private employment outside the village, access to credit (1 of 5), as well as savings (1 of 5). The only reason related to physical assets – an inherited production facility – is mentioned once.

9.4.4 Casabamba

Reasons why households **remained poor** (Table 9.9) are related to human capital (mentioned two times in total) such as the lack of labor force in a household due to being a single mother / widowed / divorced (1 of 2) or to being lazy (1 of 2).

The main reasons mentioned for **escaping poverty** were related to certain strategies (mentioned four times), such as investment in livestock (2 of 4), agricultural / crop diversification (1 of 4), and investment in potato (1 of 4). Also mentioned (once each) as the reason for escaping poverty are physical assets such as inheritance, financial assets in the form of earning an off-farm income through their own business / trade, and human capital such as the ability to work hard and to be dedicated.

Table 9.9: Main reasons for dynamics as mentioned in the assembly of Casabamba

	RP	EP	BP	RNP	
Financial Capital [F]	-	1	-	13	
Human Capital [H]	**2**	1	**2**	1	
Natural Capital [N]	-	-	-	-	
Physical Capital [P]	-	1	-	3	
Social Capital [S]	-	-	-	5	
Strategies [STR]	-	**4**	-	**23**	
Total number of reasons	2	7	2	45	56

Source: Community assembly

The reasons mentioned for a household **to become poor** were related to human capital (two times in total) such as illness / accidents / physical disability / old age (1 of 2) and being a single mother / widowed / divorced (1 of 2).

The most often mentioned reasons for **remaining non-poor** were related to strategies (mentioned 23 times in total) such as agricultural / crop diversification (12 of 23), investment in livestock (9 of 23), and investment in potato (2 of 23). The next most mentioned reasons were related to financial capital (13 times in total): most families earn an (extra) income by running their own business / trade (10 of 13); or, as another income source having a government job (1 of 13), daily labor (1 of 13) and access to credit (1 of 13) are mentioned. The following most mentioned causes were related to social capital (five times in total): help from family, friends, and others (5 of 5) and which is also linked to the next most mentioned reason related to physical capital (five times in total): inheritance (5 of 5). The least mentioned reasons for escaping poverty were related to human capital – meaning the ability to work hard and to be dedicated (1 of 1).

9.4.5 Aggregated Causes for Dynamics as Mentioned in the Assemblies

The results from the four assemblies show a quite similar perception of poverty increasing or reducing factors in all communities.

Remaining poor: The reasons mentioned most in the participating villages were either related to financial capital followed by human capital related reasons (Aymará and Ñuñunhuayo), and/or to human capital followed by financial capital related reasons (Huayta Corral, Casabamba).

Becoming poor is induced by a similar set of reasons as remaining poor, with the exception that human capital related reasons are more often mentioned than financial capital related reasons.

The reasons mentioned most often for remaining poor and becoming poor were:

- Input constraints, meaning mostly financial restrictions that don't permit investment in agriculture **[F]**
- Maintenance of a big family, in terms of expenditures **[F]**
- Insecure income base **[F]**
- High spending related to ill health / accident **[F]**
- Illness, accident, physical disability, old age as determining factors for ability to work **[H]**
- Lack of labor force in a household due to being a single mother, widowed, divorced **[H]**

Escaping poverty: The reasons mentioned most often in all the villages are certain strategies households pursue. These strategies are also the most mentioned reasons why households **remain non-poor**. As strategies mentioned by the assemblies were:

- Investment in potato
- Agricultura / crop diversification
- Investment in livestock

Since strategies depend on the combination of certain assets a household has access to (4.2), a closer look on the asset endowment provides the information of reasons for escaping poverty and remaining non-poor. Both are linked to a similar set of causes. Reasons, which were mentioned most often, are linked to financial assets and to social assets:

- Access to credit, remittances, savings **[F],**
- Off-farm income sources such as women's economic activity, seasonal employment outside of village, government job, business / trade **[F],**
- Help from family, friends, others **[S],**
- Unity / Organization of the family **[S].**

Since the causes mentioned in the assemblies for trajectories into well-being categories or poverty respectively did not differ much in between the villages, they were aggregated for all participating communities (Figure 9.2). Out of the information as provided by the assemblies hypothesis on reasons for the dynamics of every well-being category were derived, such as:

Households remain poor because of deprived financial capital.

In order to make general statements for the reasons influencing the well-being of a household in the participating communities, these hypotheses were either verified or falsified by results of the household survey. The analysis first concentrates on the assets level and provides findings for the asset endowment of households in each category (9.5).

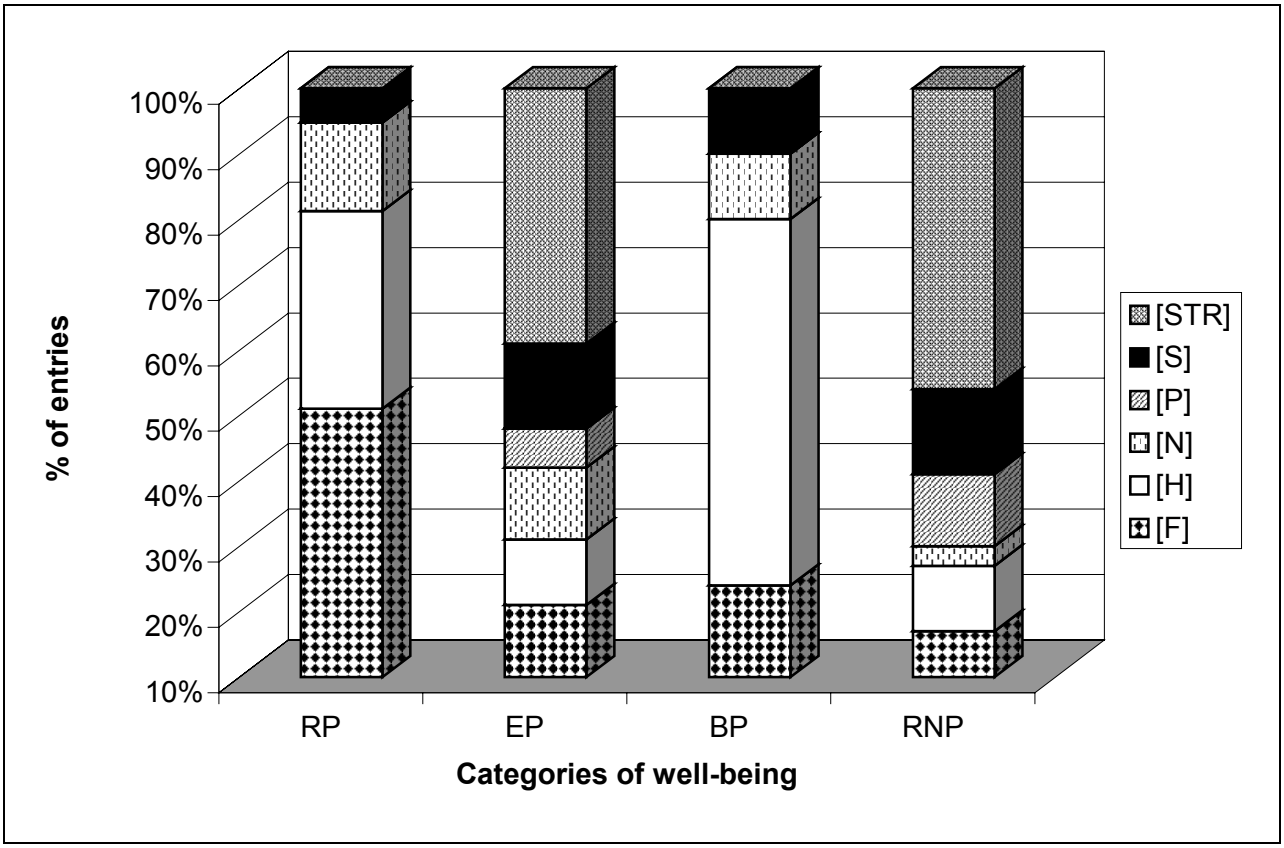

Figure 9.2: Reasons for dynamics of poverty for each category as mentioned by the assemblies (Community assembly)

9.5 Main Factors Influencing Poverty in the Participating Communities

9.5.1 Why do Households Remain Poor?

In chapter 9.4, the reasons for remaining poor were identified by the assemblies. Since they did not differ much between the villages, the mentioned reasons were summed-up for all communities (Figure 9.2). According to these reasons, as provided by the assemblies, the following hypotheses were derived:

- Remaining poor is mostly related to deprived **financial assets [F]**.
- Remaining poor is related to a lack in **human capital [H].**
- For the remaining poor **natural assets [N]** seem to play an important role.
- Less developed or lacking **social capital [S]** is a reason for remaining poor.
- Causes related to **physical assets [P]** seem not to play a role for households remaining poor.

Not a single reason but a set of reasons was identified as decisive as to why households remain poor. This interdependency and interlinkage of reasons is also clearly illustrated by a testimony of a remained poor household head in the community of Casabamba (Box 9.1).

Concerning the above-mentioned hypothesis, the results of the household survey confirm that:

Remaining poor is mostly related to deprived financial assets [F].

Financial resources available to a poor household are restricted and do not permit savings and hence the investment in agriculture, which causes losses in terms of income. Households obviously have access to very restricted financial resources. The average cash expenditure of a household in this category is about 1.86 NS (US$ 0.54) per day per capita, about 50 % of this expenditure goes to purchase food (0.94 NS / US$ 0.28).

The size of a household seems to be significant in influencing welfare dynamics due to the dependency ratio[76].

[76] Ratio of income to non-income earning members of a household (WB 1999:19)

Evidence from the survey suggests that in households that remained poor usually only one person contributes to the family income, whereas in a household that escaped poverty at least two people contribute to the family income. The dependency rate of a poor family is much higher than the dependency rate of a household that escaped poverty (3 / 1 to 3 / 2).

Box 9.1: Remaining poor

Mr. T. lives in Casabamba and is 60 years old. His wife was still alive 15 years ago, but she was suffering from rheumatism. He owned land but he had to give it away because now there is nobody to help him work the fields. He only cultivates some potato, *ulluco*, field bean and barley on a very small field mostly for his own consumption; very little is sold. The agricultural production is low as he doesn't have enough money to buy inputs like fertilizers and pesticides. He owned 6-8 sheep but he had to sell them to cover the costs of his wife's funeral. Nowadays he does not have enough money to buy livestock, which is why he does not breed livestock any more. Once a week he works in the city of Huancayo, carrying heavy sacks on his back, but the wage is not enough to cover his needs. Since he is old, he does not have enough strength to keep on working and he does not have children who could support him.

Source: Interview with villager

The household survey confirms that high expenditures caused by illness and / or accident also seem to be a reason why households remain poor. The average spending on health of an average household in this category is usually very little: About 50 NS (US$ 15) per year, which is only 2 % of a households' annual cash expenditure (2,494 NS / US $ 756). Only three households in this category spend more than the average 50 NS per year on health. These households' expenditures are generally much higher than the average cash expenditures of a household in this category (3,795 NS per year / US$ 1,150), with 18 % (667 NS per year / US$ 202) of their annual expenditures on health alone. These high costs diminish the financial capital of a household and limit its ability to save; which might be a cause for remaining poor.

Another reason for remaining poor is to be seen in unstable income due to lack of diversification. Low wage labor (average wage 6-12 NS / US$ 2-4 per day) offered on a daily basis is a source for (additional) cash income. Wage labor was mentioned only by one household to be the main income source, but it is an important additional income source for households that remained poor: For 10 % (2 of 21), it is the second most important income source and for 14 % (3 of 21) on-farm wage labor is the third important income source. Chapter 9.6 points out the compensatory character wage labor has for poor families: to sell their labor force is one of the strategies to cope with loss of income due to low potato prices.

Access to credit is limited for households that remained poor, as are remittances: 91 % (19 of 21) did not receive a credit in the last 15 years, and 91 % (19 of 21) do not receive remittances.

Remaining poor is related to a lack in human capital [H].

The household survey confirms that for a poor household the ability to work is often restricted due to illness, accident, physical disability, and / or old age. A bad state of health – being both the result and the cause of poverty – is one of the most important factors why households stay poor. In the group of people that remained poor 86 % (18 of 21) face serious health problems such as respiratory problems (30 %, 5 of 18), gastro-intestinal problems (30 %, 5 of 18) and physical disability (30 %, 5 of 18). Health also plays a very important role when it comes to nutrition security (10.2).

For households headed by single mothers or widowed / divorced heads of households the family labor force is diminished. This is another important reason why households remain poor in the participating communities. As described above (6.2.2) women are more likely to remain alone after the loss of a partner, this fact might explain why one-third of the households that remained poor are headed by a single woman (7 of 21), in only two cases are households headed by a single man.

The lack of human capital in terms of skills and knowledge is another reason why a household remains poor. While 62 % (13 of 21) of the heads of households that remained poor did not attend primary school at all or did not finish it, only 36 % (8 of 21) of the heads of the household that escaped poverty are lacking primary education. As shown in chapter 11, people that remained poor participated less frequently in training sessions provided by extension services.

For remaining poor natural assets [N] seem to play a role.

The results gained by the household survey confirm that access to land is one decisive factor when it comes to rural poverty: Households that remained poor have access to an average of 1.5 ha of land, which is less than half the average of 3.3 ha in all the participating communities.

Less developed or lacking social capital [S] is a reason for remaining poor.

Some households remained poor because of lacking of social capital, because the social resources upon which people draw in pursuit of livelihoods are less developed or lacking. One fourth of the families identified a lack of unity and organization in the family as a cause for staying poor, no help from families, friends and others is also identified as a cause for remaining poor (5 of 21). Only 40 % (8 of 21) of the households that remained poor were members of associations such as the producers association; meanwhile the average number in all the participating communities figures 60 % (70 of 120). Access to institutions in terms of agricultural support is described and analyzed in chapter 11.

9.5.2 Why do Households Escape Poverty?

Out of the summarized information given by the assemblies (9.4.5) hypothesis on escaping poverty can be derived:

- Certain **livelihood strategies [STR]** seem to play the most important role.
- The reasons mentioned most often were related to **financial capital [F].**
- Significantly important for a household were **social resources [S]**.
- **Natural assets [N]** are important to escape poverty.
- **Human capital [H]** is one of the contributing factors why households have escaped poverty.
- **Physical capital [P]** seems to play a role for escaping poverty.

No single reason is usually associated with escaping poverty; multiple interrelated factors contribute to a household's change from poor to better off. A testimony (Box 9.2) shows the diversity of reasons that can lead to escaping poverty by an example.

Certain livelihood strategies [STR] seem to play the most important role when it comes to escape poverty.

As livelihood strategies agricultural / crop diversification was mentioned by 11 % (5 of 47) of the households that remained poor, investment in potato by 16 % (8 of 47) and / or investment in livestock by 6 % (6 of 47) of the households that escaped poverty.

The role of these strategies in livelihood outcomes such as well-being, food security and sustainable use of natural resources is further described in chapter 10. In the following, the assets required to pursue these strategies are described in detail.

The reasons mentioned most often for escaping poverty were related to financial capital [F].

Findings from the household survey suggest, that the financial situation of households in this category seems to be more stable than for a household that remained poor: About 2 NS (US$ 0.60) were spend per day and capita, one third of which on food (0.65 NS / US$ 0.2).

Earning an (additional) off-farm income by running an own business / trade, through women's economic activity or with wage labor is contributing to escape poverty. Evidence suggests that agriculture is still the most important income source for 96 % (45 of 47) of households in this category; non-agricultural income is only mentioned by 4 % (2 of 47) as the most important income source. Nevertheless, off-farm income is an important additional income source for households in this category: for 6 % (3 of 47) it is the second important, and for 12 % (6 of 47) the third important income source.

Box 9.2: Escaping poverty

Mr. P. lives in Aymará and is 37 years old. Around 20 years ago, when he had just married, he had no land and no livestock because they were poor and his parents didn't give him a heritage. Therefore, he had to migrate to Lima, working as laborer in a textile factory. He was able to save money and with that money he bought some livestock, which he started to raise with the help of his wife. He also cultivated potato as a share cropper. Since he had good harvests, he was able to buy some land. He moved to the jungle to work in the orange and coffee harvest, and thus could save more money and when he came back to his village again, he bought more land. He has planted potato and because of good production, he could afford to continue investing in livestock as well as in agriculture. Mr. P. stresses that this progress has been the result of the effort and work of the whole family.

Source: Interview with villager

In some participating communities, access to credit was mentioned as a factor why households escaped poverty. Whereas roughly 90 % (26 of 30) of the poor have never received a credit in the last 15 years, about 40 % (17 of 47) of households that escaped poverty have. Remittances in terms of financial support do not play a role to escape poverty, only 8.5 % (4 of 47) of the households received remittances.

Significantly important for a household to escape poverty were social resources [S].

Help from families, friends, and others – related to unity / organization in the family – were identified as important factors to escape poverty, 11 % (5 of 47) of the households mentioned family related reasons as the reason for an improved economic situation. For the role of institutional agricultural support through access to either governmental or non-governmental institutions see chapter 11.

The natural assets [N] are important to escape poverty.

According to the survey data households that escaped poverty have access to about 2 ha of land which does not differ too much from the land access remained poor households have and is still below the average of 3.3 ha. This finding shows clearly, that only access to sufficient land does not contribute to escape poverty but a combination of assets.

Human capital [H], in terms of ability to labor is one of the contributing factors why households have escaped poverty.

This factor is directly linked to health issues. The findings of the household survey show that the health situation of households that escaped poverty is still bad but better than that of those households which remained poor. About 60 % (29 of 47) of the households report serious health problems in the family compared to the even higher figure of 86 % (18 of 21) of the households that remained poor. The better health status might be both a cause and a consequence of escaping poverty.

The survey also confirmed the importance of skills, knowledge, and information for escaping poverty. Compared to households that remained poor, households that escaped poverty are much better educated. Even though a most concerning number of 36 % (10 of 47) of the heads of household either have not attended school or have not finished primary school this figure is much smaller than the in the category of households that remained poor (62 %, 13 of 21).

In the participating communities, physical capital [P] in terms of (inherited) production facilities seems to play a role for escaping poverty.

Households that escaped poverty possess more agricultural production facilities nowadays, which can be interpreted as either reason for or consequence of escaping poverty (Figure 9.3). In this category the use of modern agricultural inputs such as new varieties (77 %, 36 of 47), chemical fertilizers (72%, 34 of 47), pesticides (100 %, 47 of 47), and diffusion backpacks (68 %, 32 of 47) is widely spread and has increased significantly over the last 15 years. Further information on agricultural inputs is given in the chapter 10.1.6.

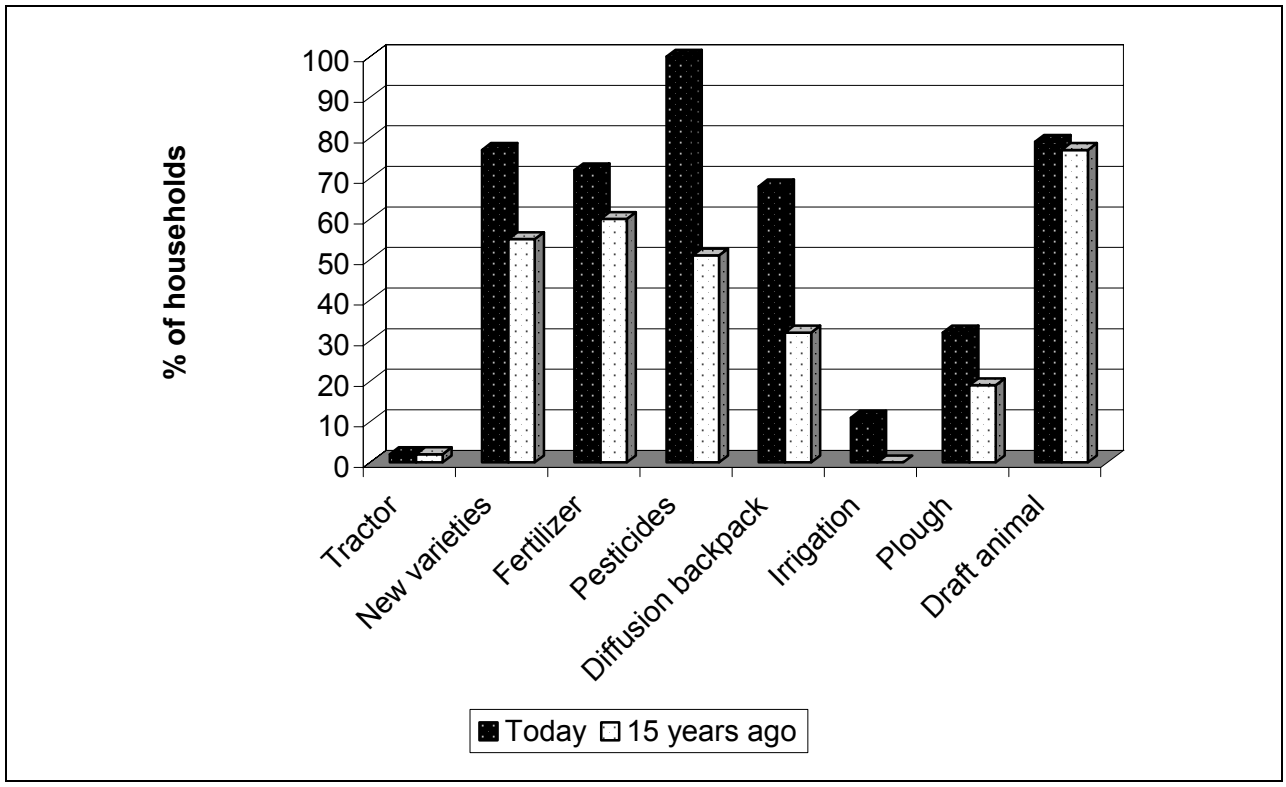

Figure 9.3: Possession of agricultural production facilities today and 15 years ago (Household survey)

9.5.3 Why do Households Become Poor?

Households that became poor suffered from limitations imposed by a similar set of factors as households that remained poor (Figure 9.2). As hypothesis on why households became poor can be said:

- Households primarily seem to fall into poverty because of deprivation of **human capital [H]**.
- Becoming poor is related to **financial assets [F].**
- **Natural assets [N]** seem to play a less crucial role for a household to become poor.
- Households became poor in terms of less developed or lacking **social capital [S].**
- Reasons related to **physical capital [P]** do not play an important role concerning descent into poverty.
- Certain **strategies [STR]** are not mentioned as reasons to become poor.

Many of the mentioned reasons why households became poor are depicted in Box 9.3 by a testimony recorded in the community of Aymará.

Households seem primarily to fall into poverty because of deprivation in human capital [H].

Findings from the survey show that the health situation in households that became poor is more or less average: 56 % (5 of 9) have suffered from serious health problems.

Box 9.3: Becoming poor

Mrs. R. is 65 years old and lives in Aymará. She has four sons and three daughters. Two of them live in Lima and send money between two and four times a year. Mrs. R. has always lived in her village, and she used to help her husband in agriculture and livestock husbandry. In April, her husband died; and her sons and daughters distributed the land. Since then, she has lived alone. Because of her husband's disease, she had to spend a lot of money, and consequently her economic situation worsened. Now, due to her age, she cultivates only a little parcel of land and raises a little livestock as "insurance" for needs that might occur.

Source: Interview with villager

The factor that induces descent into poverty is often old age. Households' heads in this category are older than in other categories, the average age of heads of households that became poor is 57 years, whereas it is 50 years for households that remained poor, 40 years for households that escaped poverty and 43 years for households that remained non-poor.

Furthermore, the survey confirms the lack of labor force in a household as a contributing factor to becoming poor: almost 80 % (7 of 9) are either a single mother, or widowed or divorced.

No access to education was identified as another reason why households became poor: 66 % (6 of 9) of the heads of the household did not attend classes at all or did not finish primary school. Compared with the findings of other categories, the level of education seems to play a crucial role when it comes to poverty.

Becoming poor is related to financial assets [F].

Evidence suggests that the average expenditure is relatively high compared with households in other categories: households in this category spend 2.7 NS (US$ 0.82) per day per capita, out of this roughly one half – 1.2 NS (US$ 0.37) – was spent on the purchase of food. At the same time, the financial resources available to a household that became poor are restricted; households in this category have the least diversified income sources and depend only on on-farm income and remittances.

Poor people have less access to credit; in this category, only 10 % (1 of 9) of the people have received a credit in the last 15 years. Due to the mostly old age of the households' heads, remittances play a more important role in this category: 44 % (4 of 9) of the households receive financial support from family members.

Natural assets [N] seem to play a less crucial role for a household to become poor.

As mentioned in chapter 9.5.1, access to land is one decisive factor when it comes to rural poverty, but not the only one. The survey shows that households that became poor have access to approximately 2.2 ha of land, which is even more than the 2 ha households that escaped poverty have access to. Access to land is a necessary but not a sufficient condition to avoid descent into poverty. Households that became poor still have enough land, but what was actually lacking is financial assets in terms of investment capital, human assets in terms of labor force, physical assets in terms of agricultural production facilities etc.

Households became poor in terms of less developed or lacking social capital [S].

The households survey confirms that in almost all cases in this group the head of the household was either a single mother or widowed or divorced (78 %, 7 of 9), which might be cause for lack of unity, organization in the family and help, all identified as factors contributing to descent into poverty.

Thirty three of the households in this category blame no help from friends, family, or others for becoming poor. This is reasonable if one considers that primarily people of advanced age are in danger to become poor. They depend on their social resources to a high degree.

Reasons related to physical capital [P] do not play an important role concerning descent into poverty.

The possession of agricultural assets did not change much in the last 15 years. The reason could be that households, that became poor, did not invest much in physical capital in terms of agricultural assets.

Certain strategies [STR] are not mentioned as reasons to become poor.

This is reasonable since strategies depend on the asset endowment of a household, which is quite insufficient for households that fell into poverty.

9.5.4 Why do Households Remain Non-Poor?

Households remained non-poor because of access to a similar set of assets as those households that escaped poverty (Figure 9.2).

- Households remained non-poor because they pursue certain **strategies [STR]**.
- In terms of assets, the main reasons for remaining non-poor seem to be related to **financial capital [F]**.
- Significantly important for a household to stay non-poor are **social resources [S]**.
- Almost as important as social capital are **physical [P]** and **human assets [H]**.
- Last but not least, **natural assets [N]** were mentioned.

A first impression of causes and contributing factors why households remain non-poor is given by a testimony recorded in the community of Huayta Corral (Box 9.4)

In terms of assets, the main reasons for remaining non-poor seem to be related to financial capital.

Findings from the household survey suggest that households in this category spent about 2 NS (US$ 0.60) per day and per capita; and roughly half that amount (0.94 NS / US$ 0.29) was spent on food.

The survey data confirms that households that remained non-poor have the most diversified income base. Even though agricultural activities are still the most important income source for 90 % (41 of 43) of the households, earning an off-farm income by running their own business / trade, by a woman's economic activity or by wage labor is contributing to remaining non-poor. Off-farm income is an important additional income source for households in this category: for 24 % of the households (10 of 43) that remained non-poor, off-farm income is the third important income source (after livestock and agriculture).

Access to credit seems to be a crucial factor why households remained non-poor; in this category 23 % (10 of 43) of the households have had access to credit. Remittances play a rather small role for households in this category; only 9.3 % (4 of 43) receive monetary support from family members.

Box 9.4: Remaining Non-Poor

Mr. V. is 68 years old and lives in Huayta Corral. When he was young, he went to the mountains to work, taking his livestock with him. He came back to Huayta Corral as 48 year-old and economically well established. In the beginning, he was not successful in raising cattle, but later on he improved and could increase his stock up to 30 cattle. At that time, he also had alpacas, horses, and donkeys. His wife helped him a lot but she died. After a while, he remarried and after three years of being together, the new wife supported him by taking care of the livestock. Four of his children studied outside the village, but since they received his farm as a heritage, they came back. After learning how to manage it, they are also economically healthy. Currently, Mr. V. runs a business: He bought 10 ha of land and plants pasture for renting. Now he is old and feels that his strength is sweeping away, but he is still not willing to retire. His living standard is good now, and he has electricity and piped water. He owns sheep and has enough capital to buy cattle again. Mr. V. stated that even though he suffered from assaults and terrorism which took away some of his assets, he would not be stopped. He knows that the only way to be successful is working hard.

Source: Interview with villager

Significantly important for a household to remain non-poor are social resources [S].

Help from families, friends, and others and unity / organization in the family were identified as contributing factors to remaining non-poor.

Even though the assembled communities did not identify access to institutions as a contributing factor, evidence suggests that access to institutions in terms of the agricultural support provided by these institutions indeed plays a role. For further information see chapter 11.

Almost as important as social capital are human assets [H].

Ability to work is one of the contributing factors as to why households remained non-poor; this factor is directly linked to health issues. The survey shows that the health situation is still deficient – 63 % (27 of 43) faced serious health problems in the last 15 years – but households in this category are more likely to be able to afford medical treatment. Average spending on health per year was 70 NS / US$ 20 (2 % of total expenditures of a household), about 20 % more than in households that remained poor.

Skills, knowledge, and information needed to pursue different livelihood strategies were also identified as important for remaining non-poor. The heads of households in this group were the most educated, only 30 % (13 of 43) of the household heads did not attend or not finish primary school, 70 % (20 of 43) did either finish primary school, attend secondary school and one person even went to university.

In the participating communities physical capital [P] plays a role for remaining non-poor in terms of (inherited) production facilities.

Households of this category have been well equipped with production facilities 15 years ago and are still better equipped nowadays.

Last but not least, natural resources [N] contributed to remaining non-poor.

Access to land contributes to the well-being of a household. The survey yielded the information that households in this category have access to an average 3 ha of cultivation area.

9.5.5 Conclusions on Main Factors Influencing Poverty in the Participating Communities

Human Assets [H]:

Poverty and **gender**: Evidence suggests that poverty in the participating communities has a female face. While 89 % (8 of 9) of households that became poor and 43 % (9 of 21) of households that remained poor are female-headed, only 8 % (4 of 47) of the households that escaped poverty and 5 % (2 of 43) of the households that remained non-poor are female-headed.

“Better **education** and more experience means faster advance.”(World Bank, 1999:19). Evidence suggests that education plays a crucial role when it comes to poverty; no access to education is an important reason for poverty. The heads of the households that remained non-poor are the most educated; only 30 % (13 of 43) of the household heads did not attend or finish primary school. Similarly in households that escaped poverty: 36 % (17 of 47) of the household heads either did not attend school at all or did not finish primary school. In opposition to those 62 % (13 of 21) of the household heads that remained poor and 66 % (6 of 9) of the heads of households that became poor did not attend classes at all or did not finish primary school.

Advanced or high age is more likely to be a reason for becoming poor. Heads of households in this category on average were 57 years old. The average age of a head of household that remained poor is 50 years. Heads of households that escaped poverty on average were 40 years old and 43 years old in households that remained non-poor. In other words: Heads of households that escaped poverty or remained non-poor are much younger than in the other categories: 40 % of the household heads are younger than or equal to 35 years of age (EP: 19 of 47; RNP: 17 of 43). While 24 % (5 of 21) of household heads in families that remained poor are 35 or younger, only 11 % (1 of 9) of the household heads that became poor are 35 years or younger. These findings stress the fact that advanced age is one of the main reasons for becoming poor.

Health problems can be either the cause or the result of poverty. Evidence suggests that in the category of people that remained poor, 86 % (18 of 21) face serious health problems; meanwhile only 60 % (29 of 47) of households that escaped poverty and 63 % (27 of 43) of households that remained non-poor are suffering from serious health problems. Households that fell into poverty reported a comparatively good health situation, only 56 % (5 of 9) face serious health problems.

Financial Assets [F]:

Concerning **off-farm income,** it can be confirmed that: “Households with home-based business or off-farm employment fare better.” (World Bank 1999:19). If it has access to off-farm income, a household may improve its ability to save, which is one of the key issues in terms of success of a household: “Access to saving increases per capita growth rate” (ibd:19). For the households in the participating communities it can be confirmed, that the more diversified the

income source is the better they fare. Evidence suggests that agriculture[77] is still the most important income source in all categories: for 96 % (20 of 21) of the families that remained poor, for 96 % (45 of 47) of households that escaped poverty, for 89 % (8 of 9) of the households that became poor and for 90 % (41 of 43) of households that remained non-poor. Households that became poor have the least diversified income base; besides agriculture only remittances were mentioned as an additional income source. Almost the same picture is found in the category of households that remained poor: Apart from three cases (running an own business, being artist) agriculture is the only income source. In contrast 10 % (5 of 47) of the households that escaped poverty and 24 % (10 of 43) of households that remained non-poor mentioned off-farm income as third important income source besides agriculture. A diversified income base offers a wider coping and adaptation strategy portfolio.

Regardless how they perceive their own poverty status, the average cash **expenditures** of households in all groups are below US$ 1 per day and per capita. This finding should not be confused with other measurements of poverty using consumption levels such as the one dollar extreme poverty line of the World Bank.

Family size matters: “With higher dependency ratio households may save less leading to lower welfare changes over time.” (World Bank, 1999:19). The dependency rate[78] is higher for households that remained poor (3 / 1) than for households that escaped poverty (3 / 2) or for households that remained non-poor (3 / 2). Exceptions are households that became poor, their dependency rate is rather low (1 / 2) probably because of the financial support by family members households in this category receive: 44 % (4 of 9) of the families receive remittances.

Access to credit differs significantly between the categories: 91 % (19 of 21) of the households that remained poor and 90 % (8 of 9) of households that became poor, did not receive a credit in the last 15 years. Households that escaped poverty had best access to credits in this period: 40 % (17 of 47) of them received a credit, while 23 % (10 of 43) of the remained non-poor farmers did so.

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[77] Under “agriculture” is subsumed: cropping and / or livestock and / or wage labor on-farm.

[78] Ratio of household members that do not contribute to income to household members that contribute to income.

Natural Assets [N]:

Access to land is supposed to be one of the most decisive factors when it comes to rural poverty (GTZ, 1998:11). Evidence suggests that no access to land indeed causes poverty but access to land does in turn not protect from poverty. Access to land therefore is a necessary but not a sufficient condition to escape poverty. Households that remained poor have access to an average of 1.5 ha of land; households that escaped poverty have 2 ha on average, which does not differ too much. Families that became poor have an average access to even more land (2.2 ha) and households that remained non-poor have access to an average of 3 ha of land.

Social Assets [S]:

Community organization matters: Mutual help and community organization were often referred to as contributing to people's well-being, either by protecting them from becoming poor or by keeping them from escaping poverty. However, even though the importance of communal organization for the well-being of a household was evident, the methodology of the current study took that into account only as one form of social capital assets.

Physical Assets [P]:

Some differences in the categories of well-being did arise, especially concerning the agricultural means of production (10.1.6). In this context, inheritance plays a major role. Households that remained non-poor and those that escaped poverty possess more means of production then households which remained poor. Households that became poor often still own those production facilities, but what they are actually lacking of is an available labor force.

9.6 Coping and Adaptation Strategies in Different Categories of Well-being

9.6.1 Assessment of Coping and Adaptation Strategies

For attaining livelihood-outcomes, every farm household combines the capital assets; it has access to. Such combination of assets form certain livelihood strategies. Livelihood strategies can be pursued to cope with sudden shocks or to slightly adapt to trends and smoothly changing environments (4.2.2).

While every farm household is pursuing several livelihood strategies at the same time, the current study focuses on strategic decisions related to changes of the vulnerability context (4.2). Farm households in the participating communities were asked about their livelihood strategies in three different settings:

- Strategies during regularly occurring periods of low potato-prices,
- Strategies during periods of food shortage, caused by shocks such as crop failure or illness, and
- Strategies based on complex changes of the vulnerability-context in the past 15 years – Potentials for future improvement of living standard.

Since in most of the cases, the findings in the participating communities show strong similarities, it seems more appropriate to look at the differences in livelihood strategies between the categories of well-being. In case of a community showing particular characteristics this will be indicated. Normally a farm household in the participating communities will not just decide upon one strategy, but will pursue certain combinations of strategies.

9.6.2 Coping of and Adapting to Low Potato-Prices

During the household surveys farmers of the participating communities were asked, to explain how they compensated for income losses in periods of particular low potato prices (6.5.2). At first sight, it is remarkable that the diversity of livelihood strategies, mentioned in the became poor category is more limited than in other categories of well-being (Figure 9.4). Here, strategies mentioned have rather coping, than adaptive character (4.2.2).

In all categories, sale of livestock is the most common strategy of dealing with income losses, caused by low potato prices. This is independent of the type and quantity of livestock, a farm-household possesses. The experience of the work in the participating communities shows that here livestock has an insurance-type function. In times of good harvests and relatively high crop prices animals are bought, but are sold in meager periods.

Although the actual kind of work farmers carry out in different categories of well-being, might be different, selling their labor force on a daily basis is a quite common strategy type, to compensate for income losses. A farmer of the remained poor category will most likely work on other farmers' fields, while a farmer of the remained non-poor category, besides this can practice daily labor in non-agricultural branches, such as construction or transport.

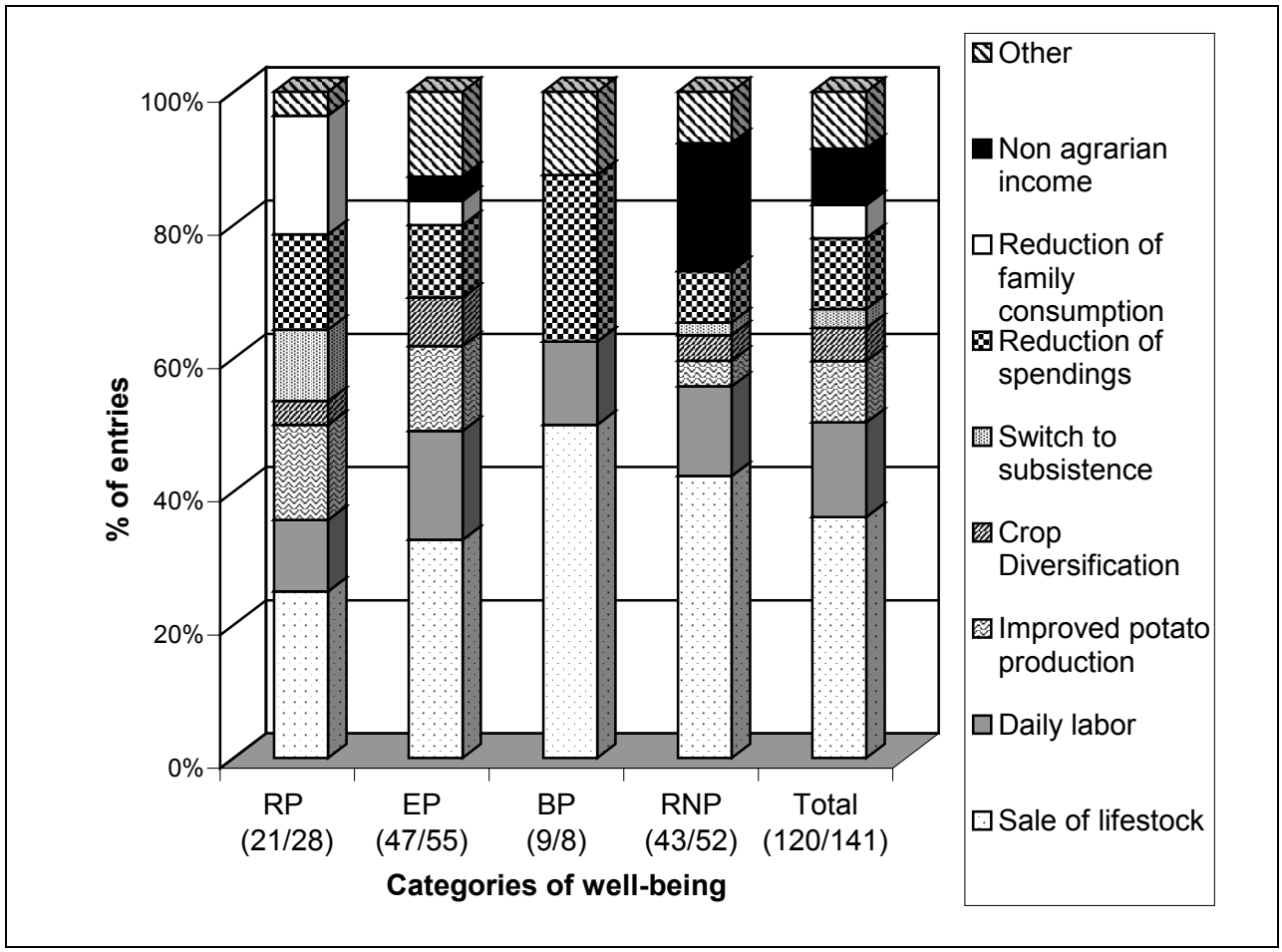

Figure 9.4: Percentage of entries for income loss compensation strategies in periods of low potato prices, by categories of well-being[79] (Household survey)

The second most important block of livelihood strategies is related to crop-production. It comprises three different strategies:

- Improvement of quality and / or intensification of potato production,
- Crop diversification, and
- Switch to subsistence.

Especially in the categories of farmers, who remained poor and the ones that escaped poverty, a considerable share of responses was related to an improvement of quality and / or intensification of potato production[80]. This rather adaptive strategy aims to secure and increase income through higher inputs in potato production.

[79] In total 120 interviews were conducted. Every household was free to give up to 2 answers to the question, in total 141 entries of livelihood strategies were received.

[80] In RP category 14 % (4 of 28 entries), in the EP category 13 % (7 of 55 entries) were related to this strategy.

Farmers of the became poor category did not mention such a strategy at all. This is possibly due to their severe lack of assets for implementing input based strategies.

In the context of the rather seasonal problem of low potato prices, only a comparatively little number of seven farmers (5 % of total entries) mentioned the adaptive “crop diversification” strategy as appropriate. It is remarkable, that again the became poor category is the only one without an entry for this strategy.

An even less number of four farmers (3 % of total entries) mentioned a “switch to subsistence” strategy. Nevertheless it is interesting to have a closer look at it. With an 11 % of all responses (3 of 28 entries) this strategy seems to be of some importance for the remained poor category. These farmers produce potatoes independently of market prices. When potato prices are at a high level, they partly sell their harvest to afford more diversified food components and to satisfy other cash-based needs. When the prices are too low, their potato serves as the only basis of daily diet – which has effects on the nutrition status of the whole family, especially the children. The only farmer of the remained non-poor category, who mentioned the “switch to subsistence” strategy, is from Casabamba. He does not depend on the potato market. Potato production for him is only a minor source of income apart from non-agricultural economic activities.

The high number of entries for non-agricultural compensation strategies to loss of income, because of low potato prices comes to great extend from Casabamba. Seven of the 10 entries in the remained non-poor category are from there. Presently more than half of farm households obtain a significant part of their income from off-farm activities, such as handcrafting or performing music at several events.

Reduction of spending is of relevance in all categories of well-being. It refers to reducing the cash-based needs of a household. A “reduction of family consumption” strategy implies that in order to cover their cash-based expenditures, households are forced to reduce their food consumption, both in quality and quantity. Such a strategy seems to be quite common in the remained poor category (18 %; 5 of 28 entries) and of far less importance in the escaped poverty category (4 %; 4 of 55 entries).

Under “Other” a total of 11 entries for the following strategies is subsumed: Two farmers of the escaped poverty category in Ñuñunhuayo mentioned “acquiring a loan”, 9 farmers throughout all categories except for the became poor category mentioned “storage for later sale or production of *chuño*” as appropriate strategy to compensate for income losses due to low potato prices[81].

9.6.3 Coping with Food Shortage

In all participating communities roughly half of interviewed farmers mentioned (59 of 120), that in the past 15 years they had experienced at least one period, where they had not sufficient food for the whole family. In Huayta Corral 53 % (17 of 32), in Aymará 49 % (20 of 41), in Ñuñunhuayo 47 % (14 of 30) and in Casabamba 47 % (8 of 17) interviewed households responded accordingly. The frequency and duration of food shortage differs widely among the interviewed farmers. The range of frequency reaches from one time to every year. The majority of farmers mentioned 1 to 3 times (75 %, 44 of 59). The average duration of shortage of food ranges between one week and a full year. Most of the interviewed farmers mentioned a medium duration of one to three months (56 %, 33 of 59).

As could be expected an overwhelming majority of households that have suffered from insufficient food in the past 15 years, falls into the categories remained poor, escaped poverty and became poor (78 %, 46 of 59). It is remarkable, however, that in Casabamba (39 %, 5 of 13) and in Aymará (44 %, 7 of 16) a large share of farmers of the remained non-poor category mentioned that they have been experiencing such periods of food shortage.

This finding suggests two ways of interpretation: One possible explanation would be, that the perception of “not having sufficient food” is different in the four categories of well-being. Having “sufficient food” is a normative concept, which is derived from the daily experience of every individual household. It refers to quality as well as to quantity of food. For example, in a period, which a farmer of the remained poor category would describe as having “sufficient food”, a farmer of the remained non-poor category might perceive as a time of food scarcity.

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[81] Some months after the main harvest period, the price of potato usually is higher, than at harvest peak. If a farmer has appropriate storage facilities, it is a proper strategy to wait with the sale of potatoes until prices are higher.

A glance at the mentioned reasons for food shortage allows a second possible interpretation. Throughout each category of well-being the loss of harvest, both due to extreme weather conditions and to pests or diseases was mentioned as the most important reasons for having periods of insufficient food (51 %, 50 of 98 total responses) and lack of cash (36 %, 35 of 98). This is followed by health problems (9 of 98) and robbery / theft (3 % of 98).

Therefore, it seems to be a problem, that in the participating communities even non-poor farm households in the past 15 years were highly vulnerable to sudden shocks, such as extreme weather conditions, pests, diseases or illness, as well as to recurring low potato prices. In other words, they depended to such a degree on agricultural production (potato cropping) that major crop failures or low potato prices could cause food shortage or even hunger in the family.

How did farm households in the different categories of well-being cope with food shortages? Due to the urgency of the problem of food shortage, the diversity of possible strategies is limited (Figure 9.5). The common characteristics of any of these strategies are, that they aim to immediately obtain cash.

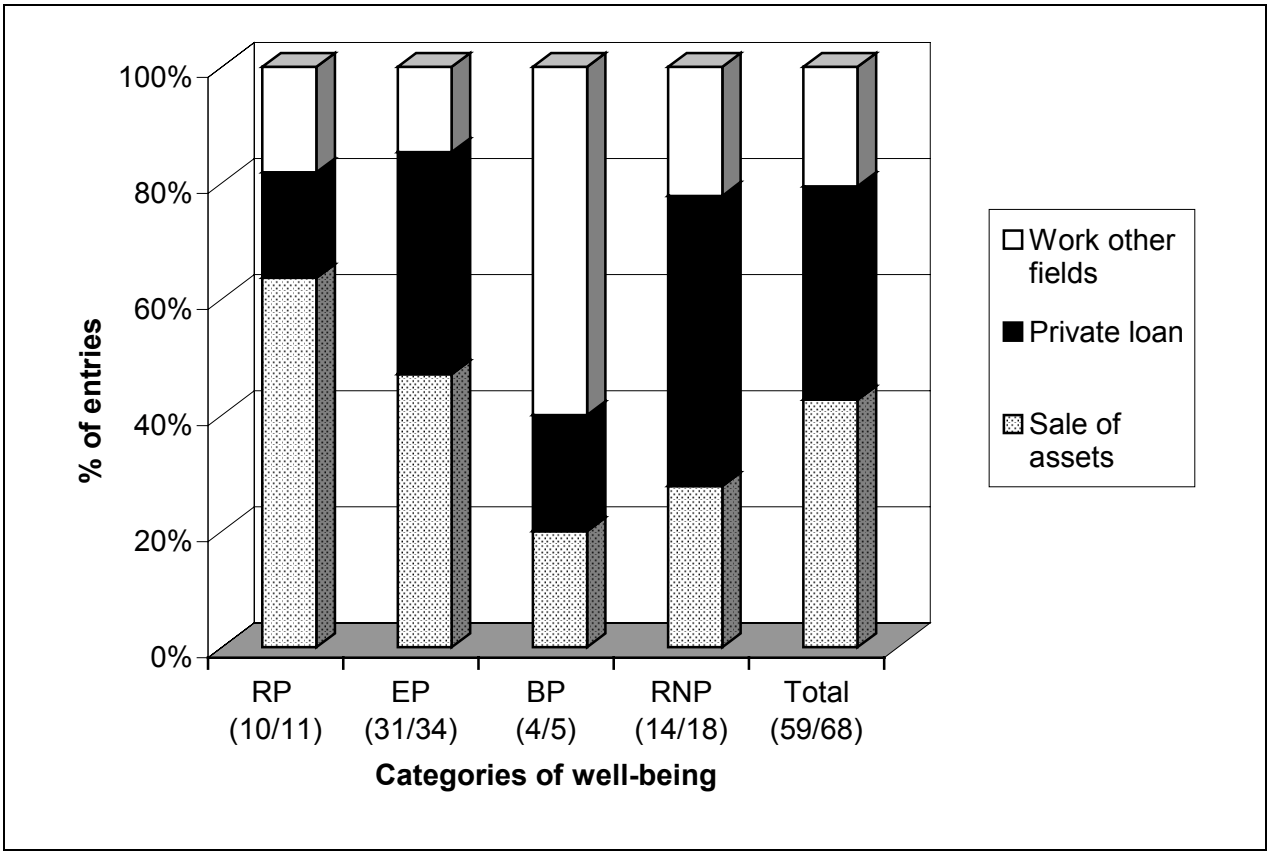

Figure 9.5: Coping strategies with food shortage by categories of well-being (Household survey)

Throughout all categories of well-being only three strategies were mentioned: “Sale of assets” such as animals, land, seeds or goods, to rather informally than formally “acquire a loan” and to “work others fields”. The main strategy of the remained poor category to cope with food shortage is a sale of assets. In the escaped poverty and especially in the remained non-poor category selling assets gets substituted by acquiring a loan. Many assets are active, means of production – selling them, therefore heavily counteracts efforts to escape poverty.

9.6.4 Potentials for Future Improvement of Living Standard

In order to receive aggregated information on farmers' individual adaptive strategies to changes in their livelihoods, farm households were asked, which potentials for improving their current living standard they saw. This question was explicitly related to farmers' experiences of the past 15 years (Figure 9.6).

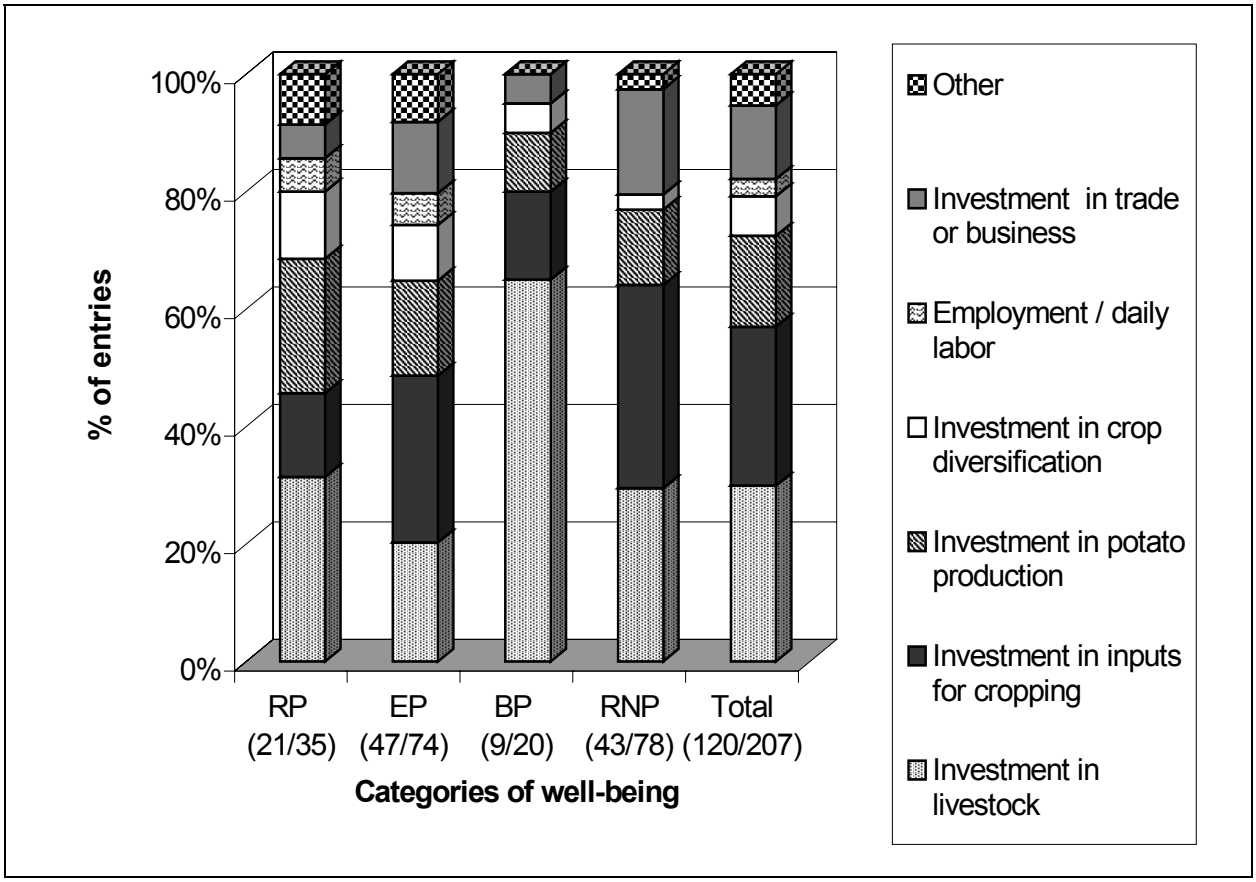

Figure 9.6: Potentials for improvement of living standard in different categories of well-being[82] (Household survey)

[82] Every household was free to give up to three answers to the question. A total of 207 entries of livelihood strategies were received. In brackets: Number of farmers in category of well-being / total number of entries.

As in the recurrent periods of low potato prices also in relation with long-term, future-oriented strategies, the diversity of responses in the became poor category is less than in all other categories of well-being. Complementary to the findings in 9.6.2 and 9.6.3, investment in livestock plays a major role for farmers in all categories of well-being. This is especially true for farmers of the became poor and remained poor categories. These farmers usually possess no or little livestock. To secure themselves from future shocks or recurrent phenomena, such as crop failure, illness, droughts or low potato prices they see the need to invest in livestock.

Except for the became poor category, cropping related strategies are the most important to the farm households in the four participating communities. Throughout all categories of well-being about 15 % of farm households mentioned investment in potato production as appropriate for future improvements of living standard. Even the comparatively high share of responses in the remained poor category (23 %, 8 of 35) seems to be surprisingly low for traditionally potato producing communities. The picture gets right, when taking into account that the responses “investment in inputs for cropping” to a large extent are also tightly related to potato production. Mentioned inputs were fertilizer, seeds, pesticides, or labor. In few cases tools and machinery were mentioned. With the exception of the became poor category (25 %, 5 of 20) a share of between 40 and 50 % of the responses were related to potato production.

The considerable number of entries for a “crop diversification” strategy to improve living standard is due to responses from Huayta Corral. Most of the answers indicating crop diversification (11 of 14 total entries) came from there. Interestingly, these responses came from all categories of well-being equally. This is likely to be the result of spreading effects of successful diversification projects with *maca* in Huayta Corral. The other three entries came from Aymará (2 RP, 1 EP). In Casabamba and Ñuñunhuayo a diversification strategy does not seem to be of priority to future improvement of living standard. The “Other” category (5 %, 11 of 207 entries) subsumes single entries of strategies like “move to city” (2 RP, 2 EP, 2 RNP), “improve nutrition and health” (1 RP, 2 EP), and “education of children” (2 EP).

10 The Role of Agriculture in Livelihood Outcomes with a Special Reference to Potato

According to the Livelihood System Approach (4.2) in the previous chapters, the vulnerability context of farmers in the participating communities (7.2.3), their assets (9.5), and strategies to cope and adapt with shocks and seasonal effects (9.6) were discussed. On the other hand, in chapter 8, the dynamics of potato production, the cropping systems, storage types and marketing structures in the participating communities were described. The chapter 10 connects these two fields of the study. It analyzes the role of agriculture, especially of potato production for livelihood outcomes of farm households.

Well-being can be understood as an overall outcome for small farmers' livelihood systems. Investment in livestock, in potato production and crop diversification are important livelihood strategies of farmers in the different categories of well-being (9.5). The roles these strategies play for farmers in different categories of well-being are analyzed in detail in 10.1. Besides, a characterization of the categories of well-being concerning land tenure, soil quality, types of small farmers and use of potato related inputs is presented.

Food security is a crucial aspect of well-being of small farmers, which is necessary to be pictured separately (10.2). To understand future opportunities and challenges to farmers in the participating communities, the sustainability of the livelihood system is analyzed (10.3).

10.1 Well-being

10.1.1 Livestock and Well-being

Besides fulfilling an insurance-like function (9.6), livestock breeding also plays a prominent role for income generation of small farm households. Throughout all categories of well-being, an average of 62 % (73 of 120) of interviewed farmers mentioned livestock as the second most important income source. An average of 10 % (11 of 120) even responded that livestock was the most important income source. “Small livestock” is rather for home consumption than for market sale.

Since “big livestock” mainly serves as draft or pack animals, farmers, when talking about livestock as an income source, mainly refer to wool and meat producing “medium” animals (7.2.2).

With an average of 9.3 heads, households that remained poor possessed the fewest “medium” animals (Table 10.1). Farmers who escaped poverty mentioned possessing nearly as many “medium” animals (32.8 heads per household) as remained non-poor farmers (35.7 heads per household). Accordingly, possessing sufficient livestock for breeding must be seen as one important cause of rising out of poverty. At the same time, to some extent, it is also an effect of it: Poor people invest their income surpluses, generally gained from potato production, in livestock to secure themselves from future shocks and seasonal effects (9.6).

Table 10.1: Possession of livestock by categories of well-being

		Big livestock		**Medium livestock**		**Small livestock**	
	Total	**Number**	**∅ Per household**	**Number**	**∅ Per household**	**Number**	**∅ Per household**
RP	21	33	1.6	195	9.3	160	7.6
EP	47	132	2.8	1541	32.8	522	11.1
BP	9	11	1.2	203	23	96	10.6
RNP	43	37	0.9	1537	35.7	431	10.0

Source: Household survey

Interestingly, with an average of 23, the number of “medium” animals owned by farm households, who became poor rank between the two extremes of remained poor and non-poor. It is likely, that these farm households still keep some livestock from better times and rather use it as insurance against shocks and seasonal effects, than as an income source. However, the mere number of livestock possessed cannot be seen as the decisive factor for falling into poverty.

10.1.2 Types of Small Farmers and Well-being

CIP researchers categorize small farmers according to their source of income and degree of market orientation or production for home consumption, respectively (6.4). Although slight differences between the single communities were found (7.3), obvious similarities for the categories of well-being became evident. Even the special situation in Casabamba does not significantly change the general picture for the categories of well-being. Anyhow the influence of Casabamba will be indicated, where appropriate.

Income diversification

Looking at the income diversification of farm households (Figure 10.1), it is eye catching, that no farm household of the became poor category conducts economic activities besides agriculture[83]. In the remained poor category only 10 % (4 of 39) of farmers mentioned to do so.

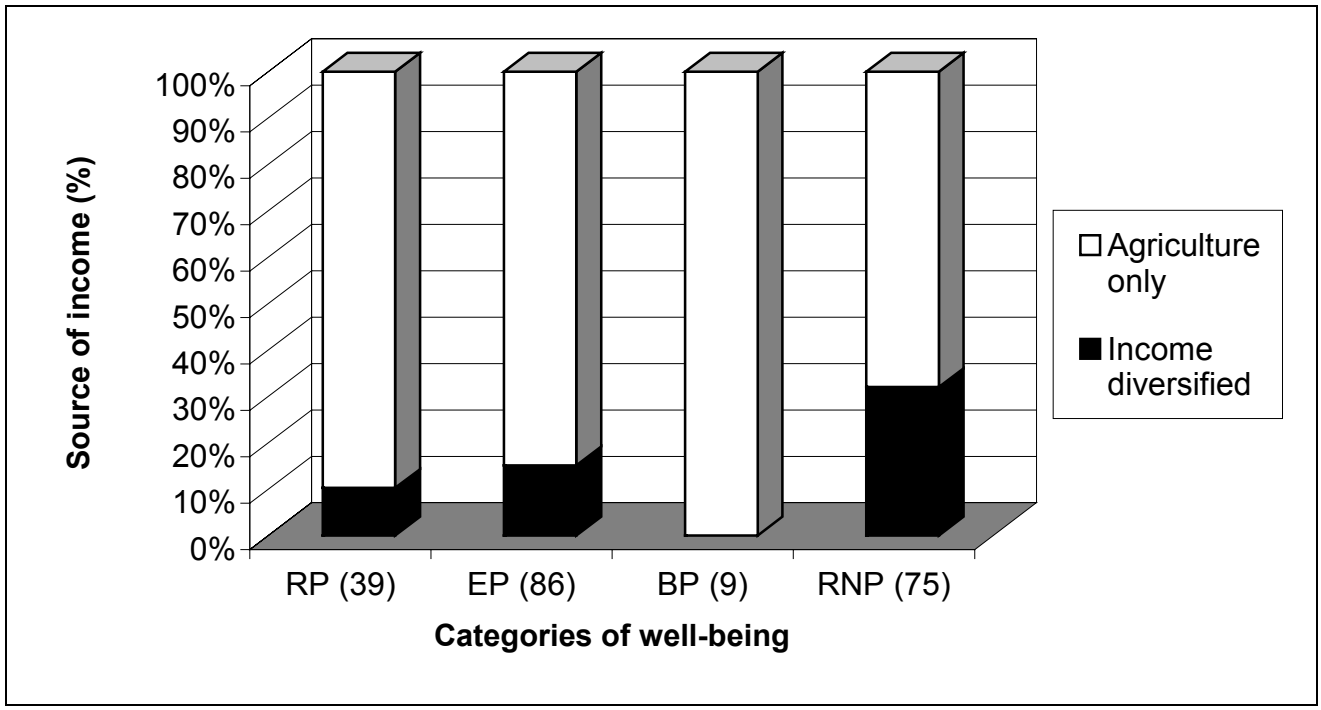

Figure 10.1: Income sources in the four communities by different categories of well-being (Community lists)

[83] For the current study income diversified farm households were predefined as generating more than 10 % of their total income by non-agricultural activities. Such economic activities can be handcrafting, employment in the city, mining, being musician, trading, transport and others (7.3).

Among the farmers who escaped poverty with 15 % (13 of 86) a slightly bigger share of farmers responded to partly get income from off-farm activities. This underlines, that escaping poverty in the participating communities was mainly related to on-farm activities (10.1.4). However a diversified income base, including on- and off-farm income sources contributes to escape poverty (9.5.2).

It is a characterizing feature of the remained non-poor category, that with 32 % (24 of 75) far more farm households, than in the other categories have diversified income sources.

Agricultural production strategy

More than a half of the households, which remained poor (25 of 39) or became poor (5 of 9) mainly produce for home consumption[84] (Figure 10.2). Pursuing a subsistence strategy (6.4) in the participating communities seems to be associated with being poor.

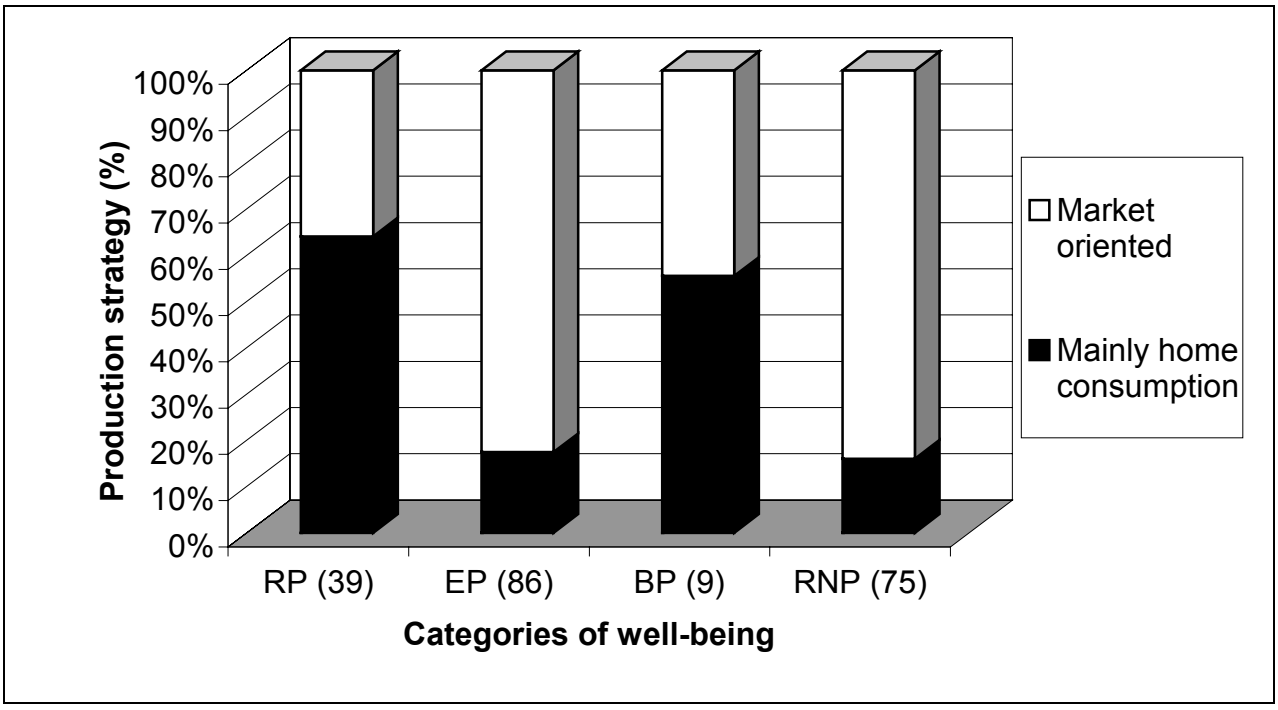

Figure 10.2: Production strategy in the four communities by different categories of well-being (Community lists)

Escaping poverty or remaining non-poor of farm households in the participating communities is associated with an orientation to market production.

[84] The bound between mainly home consumption and market orientation was set at the point of selling more than 30 % of the household's harvest (7.3).

Somehow, in contradiction to this, there are a considerable number of farm households (12 of 75), which produce mainly for home consumption, but were categorized as remained non-poor. Most of these cases (10 of 12) came from Casabamba. These households seem to practice cropping to set themselves free from dependency on the consumer market and to secure their own food supply. They are all income diversified and agriculture does not seem to be the main basis of their sustenance (7.3).

10.1.3 Land Tenure and Quality of Soils

Soil types and fertility heavily vary inside communities (6.1.2). Fertile fields do not seem to be equally accessible to farmers of all categories of well-being[85].

More than 80 % of farmers, who remained or became poor, described the soil of their fields as medium or little fertile (Table 10.2). In opposite to this, 79 % of farmers in the remained non-poor (34 of 43) and escaped poverty (37 of 47) categories stated to cultivate on fertile soils or medium fertile soils. It is worth mentioning, that 28 % (13 of 47) of farmers of the escaped poverty category declared their soils to be fertile, which is more than twice as big a share as in the other categories of well-being.

Table 10.2: Distribution of fertile soils by categories of well-being

		Fertile soil		Medium fertile soil		Low fertile soil	
	Total	**Number**	**%**	**Number**	**%**	**Number**	**%**
RP	21	3	14	8	38	10	48
EP	47	13	28	24	51	10	21
BP	9	1	11	4	44	4	44
RNP	43	4	9	30	70	9	21

Source: Household survey

The four categories of well-being seem to be characterized by a certain pattern of land tenure. Farmers, who remained poor as well as farmers, who escaped poverty seem mainly to rely on communal land (Table 10.3) – 62 % (13 of 21) and 64 % (30 of 64) responded to have communal land under cultivation.

[85] The productivity of soils in the perception of the interviewed farmers served as only criteria for fertility. They were asked to categorize the fertility of their fields in comparison to fields of other farmers in the community.

However, with a share of 62 % (29 of 47) far more escaped poverty farmers than those, who remained poor (38 % / 8 of 21) have additional private land for their cropping. Acquiring extra private land seems to be a characterizing strategy of farmers, who escaped poverty. Besides, in this category the share of those farmers, who expand their area of cultivation by renting land or share cropping, is highest in comparison to the others.

For farmers, who remained non-poor and, interestingly enough also for those, who became poor the situation seems to be the opposite. Here, only about one-third of the farmers mentioned cultivating communal land, whereas about two-thirds stated that they grow their crops on private land. Becoming poor does not seem to be caused by lack of land. What was actually lacking were financial assets in terms of investment capital, human assets such as labor force and physical assets, meaning agricultural production facilities.

Table 10.3: Land tenure in the four categories of well-being

		Communal land		Private land		Rented land / Share cropping	
	Total	**Number**	**%**	**Number**	**%**	**Number**	**%**
RP	21	13	62	8	38	4	19
EP	47	30	64	29	62	15	31
BP	9	3	33	6	67	1	11
RNP	43	16	37	30	70	8	18

Source: Household survey

10.1.4 Potato Production and Well-being

Potato production is of major importance for the well-being of farmers in the participating communities. Besides being the basis for farmers' food security (10.2), the dynamics of potato production have complex implications to small farmers' livelihoods (Figure 10.3). High potato production helped farmers to improve their living situation. Increased potato production alone, however, did not necessarily pave the way out of poverty. To escape poverty, increased potato production had to be associated with a market-oriented strategy (10.1.2).

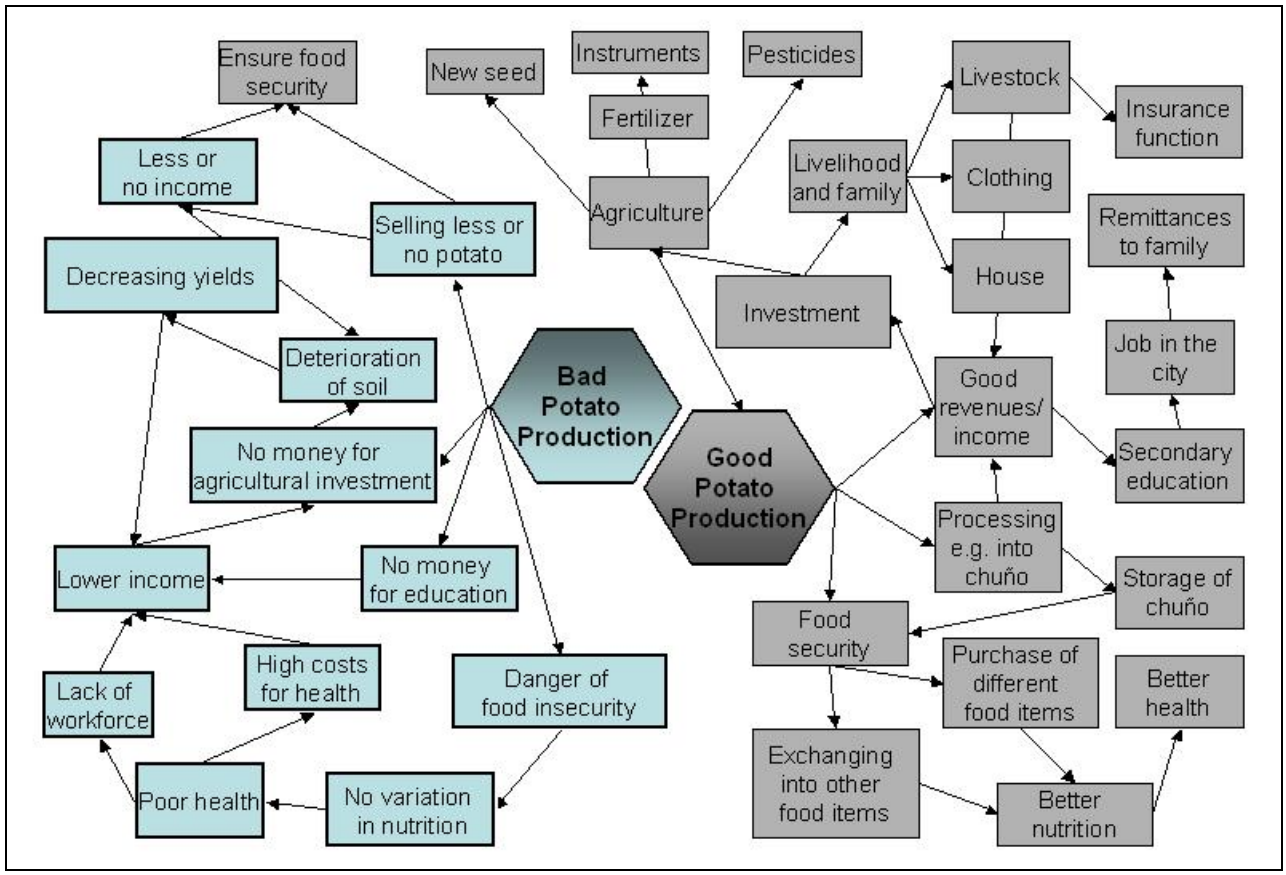

Figure 10.3: The role of potato production for livelihood outcomes as perceived by the participating communities (Community authorities)

The role of potato production for getting out of poverty is illustrated by the fact that 72 % (34 of 47) of farmers, who escaped poverty stated, that (investment in) potato production played the major role for the improvement of their living situation. As economically most important varieties were mentioned: *Peruanita* (38 % of interviewed farmers / 13 of 34), followed by *Yungay* (24 % / 8 of 34) and *Camotillo* (15 % / 5 of 34), (Annex VIII).

More than 80 % (98 of 120) of the interviewed farm households responded to produce both native and improved potatoes. Almost all farmers (95 %, 114 of 120) cultivate native potato, which constitutes the basis for home consumption. The share of farmers, who do not cultivate improved potato, is with 33 % (7 of 21) among the remained poor nearly twice as high as in the other categories of well-being. This was related to higher input prices for improved potato and the low market orientation of the respective farmers.

Today generally, the interviewed farmers of the participating communities grow more potato than 15 years ago. This is true for cultivated area as well as for total production (8.1). The dynamics, though, show different characteristics for the four categories of well-being (Figure 10.4).

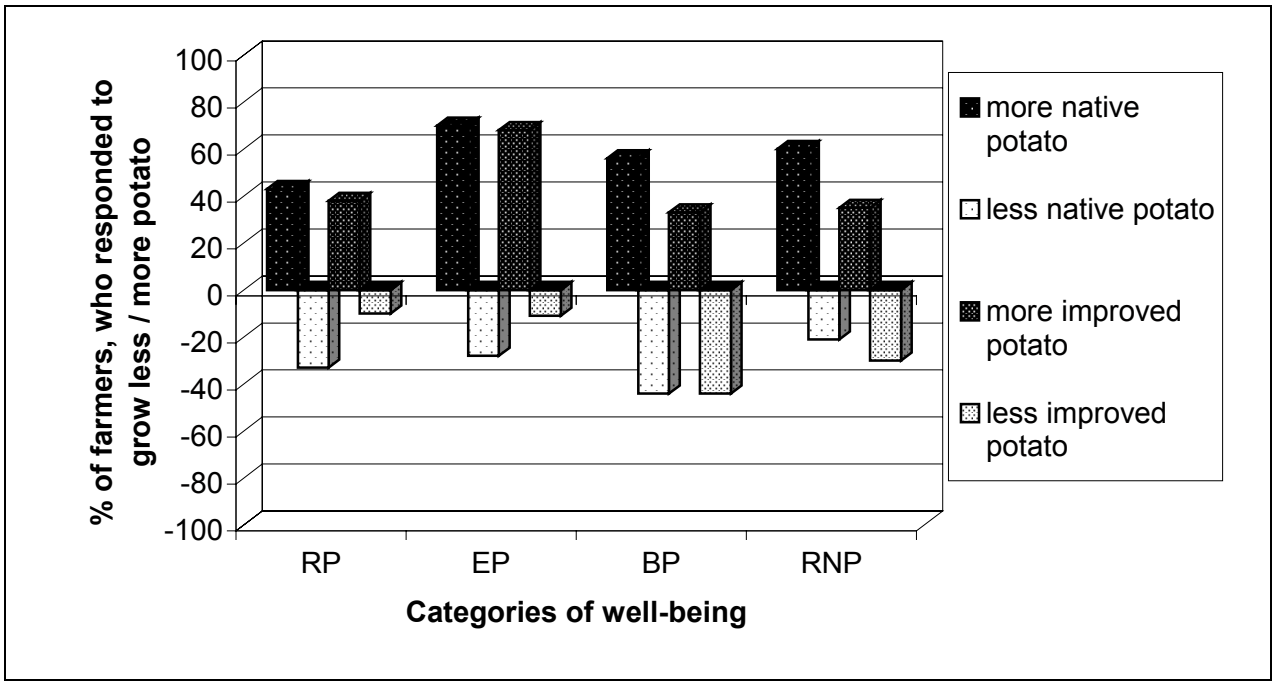

Figure 10.4: Dynamics of potato production in the categories of well-being – Percentage of farmers, who stated to produce more or less (-), than 15 years ago (Household Survey)

Forty-five percent (9 of 21) of households that remained poor produce more native potato and 38 % (8 of 21) more improved potato. Both increases were mainly related to higher home consumption, while the increase of improved-potato production is partly directed at markets, too.

The share of farmers who increased their potato production[86] is highest among the households who escaped poverty. This is true for both native and improved potato. Seventy percent (33 of 47) of interviewed farmers stated they produce more native-potato. Apart from more home consumption, farmers of this category related this increase to a higher demand and better market prices of native potato (10.1.2). The increase in production of improved potato – 68 % (32 of 47) of interviewed farmers mentioned to produce more – was mainly related to higher yields and better access to the market.

In the became poor category, a majority of households responded to produce less potato than 15 years ago. Increased potato production mostly refers to native potato, which was mainly related to higher home consumption.

[86] Dynamics in production was related to cultivated area. According to generally increasing yields (8) increased cropping area implicitly means higher total production, too.

10.1.5 Crop Diversification

A diversified crop production contributes to buffer effects of crop failures or low potato prices to farm households. Today farmers crop in shorter rotation-fallow-cycles, but at the same time more diversified (8.2). Similarly to the increase in potato production interviewed farmers throughout all categories of well-being mentioned to produce more other crops.

In lower altitudes of the intermediate agro-life zone farmers responded to cultivate more cereals, such as barley, oats and wheat. Harvests are often used as animal fodder and sometimes kept at the fields. In higher altitudes the production of Andean roots and tubers such as *maca*, *mashua*, *ulluco*, *oca* has increased. This, potentially can lead to increased food and nutrition security (10.2)[87]. Generally, no differences between the categories of well-being became evident. However, the example of the initiation of market oriented *maca* production in Huayta Corral, by CARE (7.5) shows a potential of crop diversification as a factor for poverty alleviation. Although farmers of the remained non-poor category benefited most from the project, in the escaped poverty category the number of farmers who cultivate *maca* for market sale also doubled after the project.

In Huayta Corral and Aymará, today more leguminoses, such as peas and fava beans are cultivated throughout all categories of well-being. This is an additional source of protein to farmers' daily food (10.2).

10.1.6 Potato Related Inputs and Well-being

Potato is by far the most input and cost intensive crop (6.5.2). Input constraints of small-scale farmers therefore must be seen as both a result of and a reason for poverty. In this section distinguishing characteristics of the categories of well-being regarding input-use are analyzed.

[87] As ARTs contain proteins, minerals and vitamins they can contribute to a more balanced diet of poor farm households. *Ulluco* and *oca* are especially rich in carbohydrates (10-14 %) and are of high vitamine C and A content. *Mashua* and *maca* are especially important by providing protein (11-16 %). *Maca* is also rich of essential amino acids.

Seed Supply and Storage type

Regarding the storage type, no significant differences could be observed between the different categories of well-being. Throughout all categories of well-being, traditional storage systems are used. Only one farmer, who remained non-poor, mentioned to use the diffuse light technology to store his seed potato (8.3.1).

Planting good quality seed of potato is most important for maintaining yields (8.2.4). The findings of the household survey though, show that almost 60 % (71 of 120) of the interviewed farmers in the participating communities did not once buy new seed in the past 15 years. The shares of remained poor and became poor farmers, who did not once buy new seed potato are with 71 % (15 of 21) and 67 % (6 of 9) even higher. In contrast to this, in the escaped poverty category the share of farmers buying seed is only 49 % (23 of 47). In this category of well-being, more than half of the farmers bought new seed every third to fourth year. New seed was largely bought at local markets, where its quality, e.g. being free of viruses could not be guaranteed. Single responses referred to purchases of new seed in agro stores or at INEA[88].

Mechanization and Irrigation

In all categories of well-being most of the treatment of soils during the cropping cycle is done manually, without a draft animal or a tractor (8.2.5). Differences are evident only for soil preparation and sowing. While 86 % (18 of 21) of the remained poor farmers do this manually (by *chaquitajlla*), among farmers, who escaped poverty the respective share of farmers is only 60 %. The share for became poor farmers and those, who remained non-poor, is 67 % and 63 %, respectively.

No farmer who became poor uses a tractor for soil preparation. Only one remained poor farmer responded to do so. In opposite to this 17 % (8 of 47) of farmers, who escaped poverty and 14 % (6 of 43) of the remained non-poor category stated to do soil preparation with help of a tractor. In both categories, escaped poverty and remained non-poor, 23 % (11 of 47; 10 of 43) of farmers do soil preparation with the help of draft animals.

[88] However this does not necessarily refer to improved seed varieties.

Only a few farmers (13 of 120) in the participating communities benefit from an irrigation system. Although the access to irrigation is different in the four communities (8.2.2), a look at the categories of well-being gives a quite clear picture. No farmer who remained poor has access to irrigation, whereas 11 % (1 of 9) of became poor farmers and 12 % (5 of 43) of remained non-poor farmers have parts of their land under irrigation. With 15 % (7 of 47), the escaped poverty category has the highest share of farmers who have access to irrigated land.

Use of Fertilizers

Almost every farmer throughout all the categories of well-being uses fertilizers (8.2.6). Only one “remained poor” farmer from Casabamba responded as not using any fertilizer. Differences become evident, when looking at the types of fertilizers used in the different categories of well-being[89]. While almost all farmers (93 %, 112 of 120) use organic fertilizers such as *guano*, differing shares of farmers in the categories of well-being use mineral fertilizers. The lowest share of farmers, using the different types of mineral fertilizers, characterizes the remained poor category. The opposite is true for farmers, who escaped poverty: with 40 % (19 of 47) using foliar, 66 % (31 of 47) using phosphate and 64 % (30 of 47) using NPK, the share of farmers in this category who use different types of mineral fertilizers is the highest among all categories of well-being. This finding underlines the fact that for escaping poverty a promising strategy was the investment of inputs and the intensification of production (9.5.2).

Pest Management

Practically all farmers, who escaped poverty (47 of 47) or remained non-poor (42 of 43) responded to use pesticides to manage pests, while a smaller share of 86 % (18 of 21) of farmers who remained poor and 67 % (6 of 9) of farmers, who became poor, did so[90]. This difference can be explained by lack of financial capital of the poor farmers.

[89] It turned out to be difficult to get reliable data on quantities of fertilizers applied (5.4).

[90] It turned out to be difficult to get reliable data on quantities of pesticides applied (5.4).

It is also remarkable that a smaller share of the remained poor (38 %, 8 of 21) and the became poor farmers (33 %, 3 of 9) use alternative methods of pest management[91], than of the escaped poverty (57 %, 27 of 47) and remained non-poor (49 %, 21 of 43) categories. There are two possible interpretations of this fact. On the one hand it is probable, that farmers, who remained or became poor do not have enough labor force available to apply, often labor intensive alternative methods of pest management. A further interpretation can be related to the differing levels of education in the different categories of well-being. Sufficient knowledge of agro-ecological interrelations and natural indicators are a precondition for applying alternative methods of pest management.

10.2 Food Security

Food and nutrition security – meaning availability of and access to sufficient and balanced food as well as its use and utilization – is the most crucial outcome for a household's livelihood. Thus, not only the availability of food has to be considered, but also the quality of the food and the health of the consumer: are people, concerning their state of health, able to absorb the provided food (Box 4.4)?

Easily assessable indicators that were used in the current study are:

- Number of meals per day.
- Numbers of different food items consumed, which can be aggregated by food groups, such as number of animal products, fat or protein rich food items, number of fiber rich foods.
- Frequency of most common food items (categorized as 1 to 7 times per week) serves as a powerful indicator (Gerster-Bentaya, 1997).

There is not much variation in the frequency of meals a family has per day over the categories of well-being or over the last fifteen years. 85 % (102 of 120) of the households have three meals a day. Fifteen years ago, the situation was similar. Only a very slight difference in the remained poor category (an average 2.8 meals / day now and 15 years ago) and the escaped poverty category (3.0 / 2.9) can be noticed. Few households consume two meals per day. This does not necessarily mean that the people in these households necessarily consume less food, because the size of the meals can differ.

[91] As alternative methods of pest management were subsumed biol, traps and herbs (8.2.7)

As could be expected an overwhelming majority of households that have experienced times of food shortage in the past 15 years, falls in the categories remained poor, escaped poverty and became poor (78 %, 46 of 59). However the vulnerability to hunger is not restricted to poor households (9.6.3).

Being asked how often per week the interviewed farmers consume certain food items; different consumption patterns in the different categories could be identified. The only variable with almost no variance over the categories and time is the consumption of potato and other ART crops that are the staple food of all households. Potato thus makes a vital contribution to households' food security. Key informants mentioned that people generally eat more noodles in the study area nowadays, meaning they sell more potatoes (with higher nutritional value) to buy noodles (that are more expensive but have a lower nutritional value) with the acquired cash. The non-poor categories can generally be said to eat more animal products, as well as beans, fruits, vegetables and rice (Annex X).

The participating farmers were asked to indicate how many times per week they consume protein rich food items[92], carbohydrate rich[93] and vegetables and fruits. In order to compare the diet balance of the categories of well-being, a ratio of protein intake per week against carbohydrate intake per week was calculated. Different consumption patterns become evident (Table 10.4).

Table 10.4: Food-groups intake in times per week in the categories of well-being now and (15 years ago)

Category	Protein intake / week	Carbo-hydrate in-take / week	Vegetables and fruits / week	Ratio protein / carbohy-drate intake	N
RP	6.9 (6.2)	13 (11.3)	7.2 (6.4)	0.53 (0.55)	21
EP	8.4 (6.3)	14.5 (11.8)	8.2 (6.1)	0.58 (0.53)	47
BP	6.8 (9.2)	11 (13.2)	8.2 (7.6)	0.62 (0.70)	9
RNP	9.4 (8.7)	13.6 (13.4)	8.0 (8.0)	0.69 (0.65)	43
Total mean	8.5 (7.5)	13.7 (12.3)	8.1 (6.9)	0.62 (0.61)	120

Source: Household survey

[92] such as milk, eggs, meat, poultry, beans

[93] such as potato, ART's, rice and noodles

Especially in the values of the categories that escaped poverty, and became poor, there is a correlation of well-being and protein intake. None of the categories eat a lot of meat – since meat is expensive and livestock is bred rather as insurance than for meat – but animal products in general are consumed more often in the better-off categories. The relatively high protein / carbohydrate ratio in the became poor category is due to the reduction of starchy foods apart from potato (rice and noodles), not to the high protein intake.

The variation over time in the values of animal product intake for the escaped poverty and the became poor categories hints at a strong correlation of protein intake and well-being (almost two times more / less per week instead of the average one more time per week). Similarly, a change in the well-being status of a household reflects itself in the frequency of rice and noodle consumption because these have to be bought in the market and thus require cash resources.

A similar observation can be made comparing the frequency of the food group's intake of male and female-headed households. Female-headed households do not consume protein containing food significantly less often but by also having carbohydrates fewer times per week show a better protein / carbohydrate ratio.

There seems to be a correlation between nutrition security and education, even though the relatively good nutrition of non-educated people and the relatively bad nutrition of people with secondary school attendance somewhat spoils this impression (Annex XII).

On the question for what necessary unforeseen expenditures the household had to sell activa, 7 of 21 (33 %) in the remained poor category and 2 from 9 (22 %) in the became poor category mentioned food expenses as the most important reason. In the escaped poverty category the figure was 18 of 47 (38 %) and in the remained non-poor category 6 of 43 (14 %). For health-necessities the respective figures are 4 of 21 (19 %) for the remained poor, 3 of 9 (33 %) for the became poor, 4 of 47 (6 %) for the escaped poverty and 3 of 43 (7 %) for the remained non-poor category. This is a strong indication of a greater insufficiency of food (or resources to buy food) and the necessity and capacity to afford health care in the poor categories of well-being (RP,BP).

Questioned what the alternative to a sale of activa was to cover necessary unforeseen expenses only two household heads from the remained-poor category gave reduction of family consumption (meaning hunger) as answer.

As shown in the analysis in chapter 9.5 expenditures in the categories of well-being on food were lowest in the escaped poverty category and highest in the became poor category. This can be explained by the respective households' capability to sustain their own subsistence. In the poor households, a lack of labor force could, for instance, limit agricultural production and force people to by extra food in the market. The households in the remained non-poor and escaped poverty categories on the other hand spend in absolute terms two to three times more on health, because they can afford to take better care of their health.

Health problems

In all the communities the interviewed health staff indicated that besides respiratory infections gastro-intestinal infections (colic, diarrhea) were among the main health problems, due to lack of clean water and hygienic standards but also to consumption habits that were unhealthy and hard to change. These infections especially chronic diarrhea or frequent diarrhea (parasites) contribute to wide-spread malnourishment. Malnourishment in turn causes more such diseases, which constitutes a vicious cycle. Children who consume insufficient amounts of proteins and calories are more likely to show a deficiency of vital minerals and essential fat acids and vitamins, which in turn leads to stunting and higher risk of diseases (Scherbaum and Fürst, 1999).

Sixty six percent (79 of 120) of the households mentioned chronic or severe health problems in their family (Table 10.5). Respiratory infections were mentioned most often in all categories of well-being, 25 % of the 120 households indicated this health problem.

Table 10.5: Self-reported morbidity in the categories of well-being

	Yes	No	Total
RP	18 (86 %)	3 (14 %)	21
EP	29 (62 %)	18 (38 %)	47
BP	5 (56 %)	4 (44 %)	9
RNP	27 (63 %)	16 (37 %)	43
Total	79 (66 %)	41 (34 %)	120

Source: Household survey

With the data assessed for the current study it was not possible to link the occurring health problems related to precarious sanitary conditions to the poverty status of the households.

Fifteen percent (18 of 120) of the households indicated having cases of gastro-intestinal health problems in their families. Gastro-intestinal problems were mentioned in all poverty categories equally. Six percent of the households indicated cases of diarrhea in their families, again with no difference between the categories of well-being[94].

10.3 Sustainability of the Livelihood Systems in the Participating Communities

The experience gained in the participating communities revealed that current small farmers' livelihood systems in the potato producing communities of the Peruvian highland are far from being sustainable. Farmers face two alarming trends:

- Decreasing potato prices due to overproduction, and
- Increasing soil degradation and crop productivity losses because of pests and diseases due to system intensification and reduction of fallow periods.

These two trends put small farmers' livelihoods into a vicious cycle, which results in a gradual decrease of farmers' income (Figure 10.5). If no appropriate measures are taken, this could end in a collapse of the small farmers' livelihood systems in the study region.

Many interviewed farmers agreed: "The worst pest we face nowadays is low potato prices and researchers so far have not found adequate measures to help!" (Bernett et al., 2005:1). Reasons for this are the decreasing demand for potato at the national markets (6.5.2)[95], overstocking of markets by agro-industrial farms and increased production by small farmers, as well as the dominance of intermediaries in the market chains (8.3.2). In the current study, the farmers themselves identified market-oriented production of potato as a major factor for escaping poverty (10.1.2). However, this (with regard to a long-term perspective) ignores the fact that small farmers are systematically forced to sell potatoes at prices lower than their production costs (Box 10.1). The only possible strategy to compensate for the resulting economic losses is to over-exploit their assets.

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[94] For more health data on the four participating communities see 7.2.2.

[95] A possible solution to the sinking demand could be the export of "exotic" varieties to the world market, but this is severely restricted by the phytosanitary provisions of industrialized countries (Valencia, 2005).

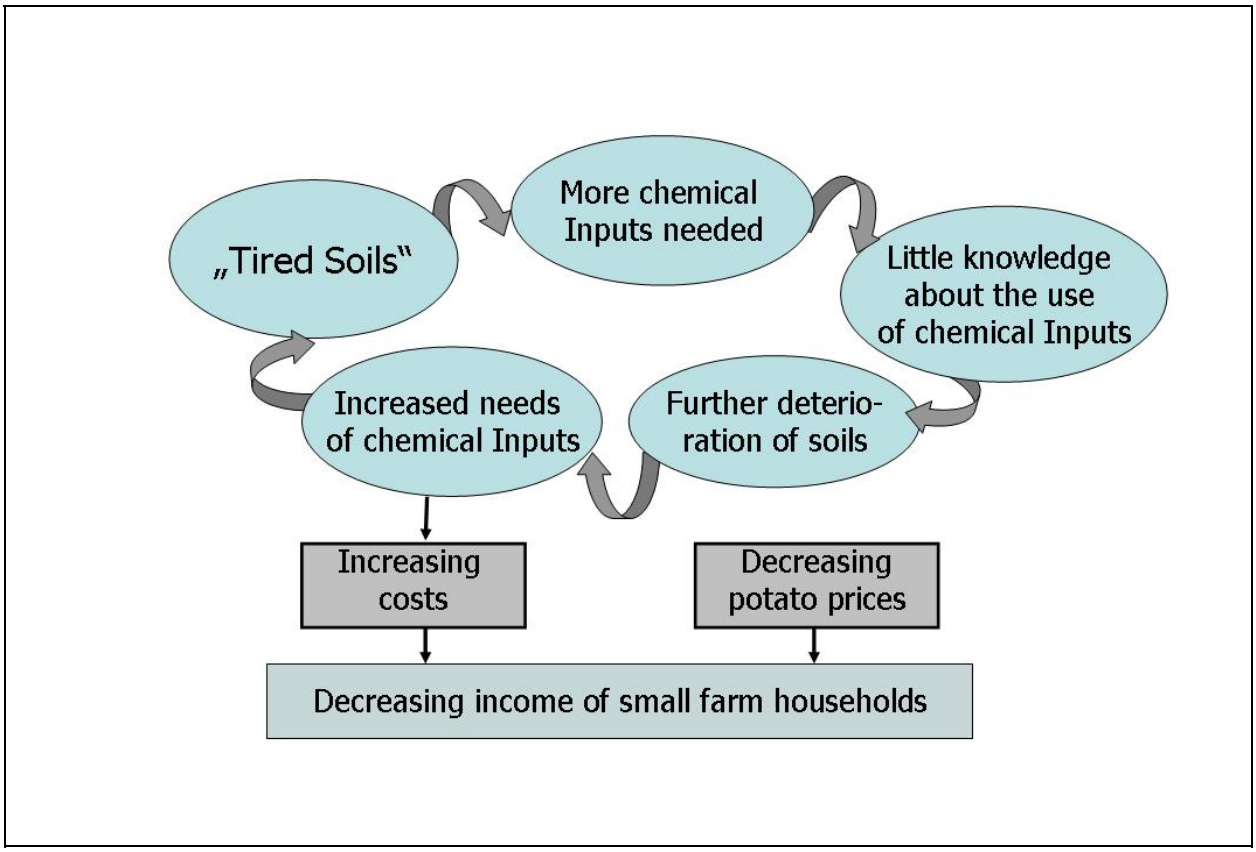

Figure 10.5: Challenges to the sustainability of small farmers' livelihoods (Own investigation)

Besides their own labor, one of those over-exploited assets is the small farmers' main means of production: soil. Farmers in all the communities and throughout all categories of well-being mentioned that soil fertility has deteriorated – or as they say: "got tired" – in the past 15 years. Apart from more frequent extreme weather conditions, which were reported to result in higher erosion, shorter fallow years and deficit nutrient removal compensation, the inappropriate use of fertilizers and pesticides were also mentioned (7.2.3). The process of soil deterioration due to intensification of production is self-amplifying (Figure 10.5). In spite of "tired" soils, farmers need to maintain or even increase their yields to sustain their current living standard.

Although farmers know that they are destroying their soils they see the only possible way in a further increase of input use, such as mineral fertilizers and pesticides: "Without mineral fertilizers and pesticides it does not work anymore". At the same time farmers lack the knowledge about when and how to best use these inputs.

Often the ecological impacts and side-effects of using pesticides and mineral fertilizers are not reflected. Inappropriate use of inputs contributes to a further deterioration of soils, which forces farmers to continue to intensify their production. The increased use of mineral fertilizers and pesticides leads to higher production costs, which besides sinking potato prices diminishes farmers' incomes.

Box 10.1: Terms of trade for small farmers' households

Cash in a rural farm economy is analogous to "foreign currency" in the economy of a country. The "foreign currency" is used for consumption of products on national markets, for example clothing, liquors, food, and production inputs. To obtain the "foreign currency", farmers need to "export" agricultural products and other resources. By desperately intending to "export" goods, they constantly devalue the elements of their own economy. The crisis, hence, manifests itself when the prices for exports decline and the prices for imports increase. To keep on operating, a farmer has to sell below his costs of production and absorb the difference himself. This is not very different to the "Terms-of-Trade" crisis, which characterizes the developing countries in their relation to the economic centers of the world.

The solutions discussed on national level are also valid for farmers:

In the short-term, increase of prices for farmers' products can have an important positive impact. In the medium-term, diminishing of production costs and by this an increase of productivity and a reduction of the dependency on imported inputs is the right way. In a long-term perspective, farmers have to diversify their production and consolidate their self-subsistence sector of their farm economy.

Analogous to developing countries, the farmers, nevertheless, do not realize the action needed to solve their problems. The farmers do not form their "OPEC" of producers to negotiate prices; they keep on devaluing their economy to keep on competing and search to increase the production to compensate the falling of prices; strategies, which sharpen the crisis from bad to worse.

Source: Translated from Mayer et al, 1992: 31-34

11 The Role of Agricultural Support for Different Categories of Well-being and in the Communities

Different types of agricultural support were provided during the last 15 years. The current study analyzes the recent agricultural support received by the farmers (11.1). At the same time reasons for no agricultural support as perceived by the farmers are given (11.2). The participation in agricultural training is not enough to help farmers getting out of poverty (11.3). In order to provide information for future intervention opportunities (12) farmers' interest to adopt new technologies (11.4) and their perceived needs (11.5) are also presented in this chapter.

11.1 Recent Agricultural Support

While 31 % of the interviewed households (37 of 120) have recently received agricultural support, 69 % of the households (83 of 120) do not obtain agricultural aid. This is consistent with some documents that indicate that only about 20 % of farmers have access to some form of extension service (Ortiz, 2005).

Only 10 % (2 of 21) of the households that remained poor and 22 % (2 of 9) of the families that became poor are receiving support from agricultural institutions. This suggests that households, which are considered to be poor for more than 15 years can count even less on access to agricultural support than families that became poor. Families that became poor might rely on relationships that they could have established during the time when they were better off.

Mainly households that escaped poverty (38 % / 18 of 47) or remained non-poor (35 % / 15 of 43) receive agricultural support (Figure 11.1).

Only 10 % (2 of 21) of the households that remained poor and 22 % (2 of 9) of the families that became poor are receiving support from agricultural institutions. This suggests that households, which are considered to be poor for more than 15 years can count even less on access to agricultural support than families that became poor. Families that became poor might rely on relationships that they could have established during the time when they were better off.

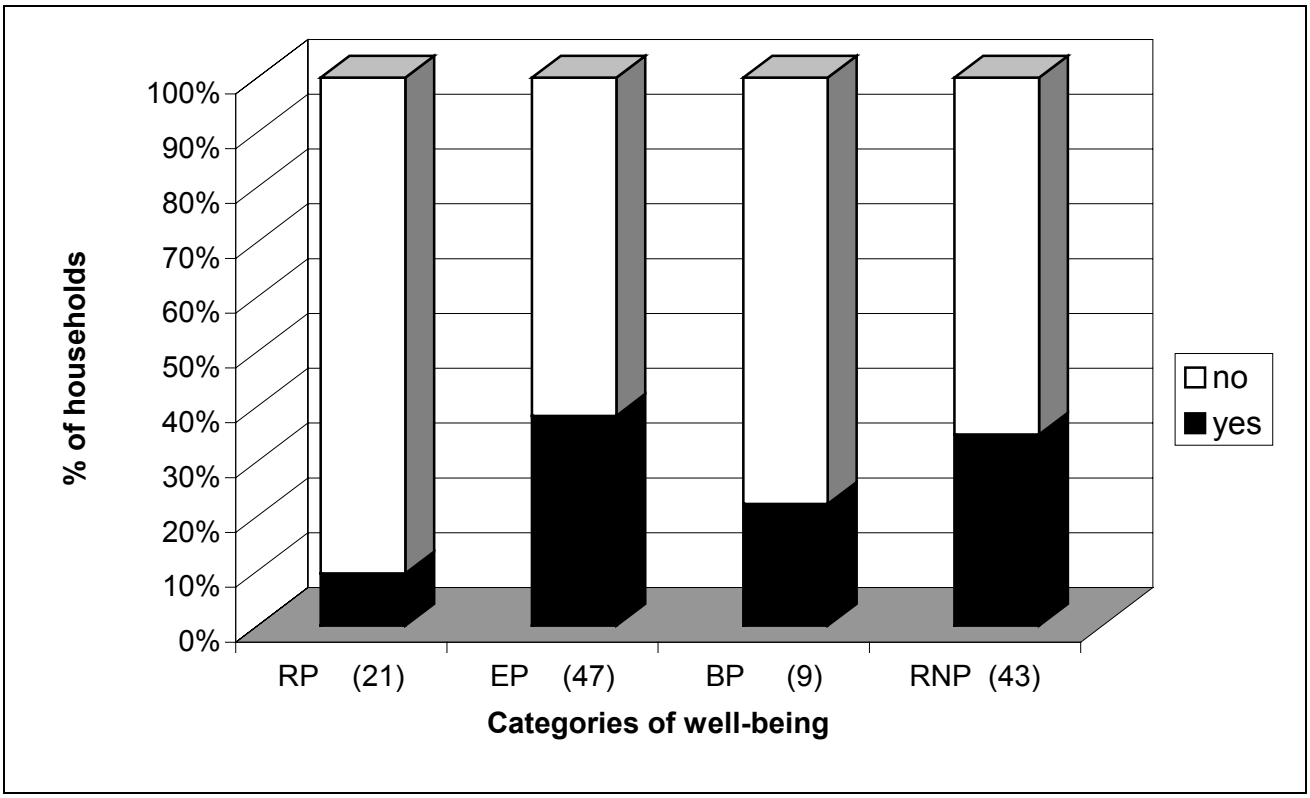

Figure 11.1: Recent agricultural support for different categories of well-being (Household survey, total number of interviewed households=120)

The distribution of recent agricultural support in the four communities indicates that the highest rate of support is in Ñuñunhuayo, where 70 % of the interviewed households (21 of 30) are beneficiaries (Table 11.1). Nearly all households benefiting from agricultural support in Ñuñunhuayo (19 of 21) are considered to be non-poor. In Aymará, 27 % of the families (11 of 41), recently received agricultural support. Nine of those households were considered to be non-poor. Thirteen percent of the interviewed households in Huayta Corral (4 of 32) receive agricultural support, all of them non-poor. With only one benefiting household in Casabamba, that escaped poverty, the recent agricultural support by institutions is low in this community. Not a single interviewed household, which remained poor or became poor in Huayta Corral, and in Casabamba, receives agricultural aid. In Aymará only one family of each of those categories receives support. Although having in total a large number of households benefiting from agricultural support, the situation is similar for Ñuñunhuayo.

The type of agricultural support recently received by the farmers differs amid the communities. For the description of the support types and programs by the different organizations see Chapter 7.5.

Table 11.1: Recent agricultural support per community and per categories

	Huayta Corral		Aymará		Ñuñunhuayo		Casabamba		Total	
	Yes	Total	Yes	Total	Yes	Total	Yes	Total	Yes	Total
RP	0	9	1	6	1	5	0	1	2	21
EP	3	17	4	14	10	14	1	2	18	47
BP	0	2	1	5	1	1	0	1	2	9
RNP	1	4	5	16	9	10	0	13	15	43
Total	4 (13 %)	32	11 (27 %)	41	21 (70 %)	30	1 (6 %)	17	37 (31 %)	120

Source: Household survey

It is important to emphasize, that only few households receive agricultural support (Table 11.2).

Table 11.2: Type and frequency of recent agricultural support per community

		Huayta Corral	Aymará	Ñuñun-huayo	Casa-bamba	Total
Technical help	CIP	0	0	18	0	18
	PRONAMACHCS	0	4	0	0	4
	INIEA	0	3	0	0	3
	CARITAS	1	0	0	0	1
New seeds / varieties	PRONAMACHCS	0	1	4	1	6
	CIP	0	1	1	0	2
Training / workshops	CIP	0	1	10	0	11
	PRONAMACHCS	0	1	1	0	2
	SEPAR	0	1	0	0	1
Commerzialization	CIP	0	2	0	0	2
Micro-credit	PRISMA	2	0	7	0	9
	PRONAMACHCS	0	1	2	0	2
Soil improvement	PRONAMACHCS	2	1	2	0	5
	CIP	0	0	1	0	1
Forestation	PRONAMACHCS	1	4	6	0	11
Vaccination of big animals	SENASA	0	4	4	0	8
Total interventions		6	24	53	1	84

Source: Household survey

The total number of recipients is higher, than the total number of households benefiting from agricultural support because some households participate in more than one support program.

In **Huayta Corral**, four households recently obtained agricultural support. One received technical help from Caritas and two households participated in soil improvement measures given by PRONAMACHCS. One of those households further received aid on forestation also from PRONAMACHCS. The other household benefited additionally from an agricultural credit from Prisma. The fourth household has also received an agricultural credit from Prisma. From the point of view of the peasants all interventions were useful to help them to improve their living situation.

The 24 cases of recent agricultural support in **Aymará** are spread among eleven benefiting families. The farmers considered that all of the agricultural support interventions were useful. Half of the cases mentioned in the survey are interventions by PRONAMACHCS. Seven families received technical support for cultivation: Four families from PRONAMACHCS and three families from INIEA. In addition, some households in Aymará profited from forestation measures by PRONAMACHCS (4 families) and the vaccination of large animals by SENASA (3 families). From CIP's intervention in Aymará two families benefited from commercialization and one family obtained new seeds of native potatoes. One interviewed farmer also mentioned the capacity building and training in potato cultivation by CIP.

Twenty households are benefiting from the 53 cases of agricultural support mentioned in **Ñuñunhuayo**. CIP was mentioned the most often as important organization, which provides the farmers agricultural support: 30 of the 53 interventions (57 %) mentioned are given by CIP. From CIP, 18 households receive technical help in potato cultivation, another ten households benefited from training. Both activities by CIP are focused on pest management. They are considered to be very useful. PRONAMACHCS worked with six families in the field of forestation and provided four families with new potato varieties. According to information given by the local authorities PRONAMACHCS introduced new potato varieties of improved potatoes, distributed fertilizers, and pesticides and helped the farmers with commercialization. Seven families further indicated that they obtained an agricultural credit from Prisma.

In **Casabamba** one household that escaped poverty received new varieties from PRONAMACHCS but stated that this help was not very useful. This is the only family interviewed in Casabamba that recently received agricultural support.

11.2 Perceived Reasons for no Agricultural Support

Interviewed households mentioned several reasons why they are not obtaining agricultural support (Table 11.3).

Not to have any offer or opportunity for agricultural support is for 58 % the most important reason among all the categories of well-being (48 of 83 households). For families that became poor it is even the only reason stated. Lack of opportunities is also the most important reason why households that remained poor are not receiving agricultural support: 63 % (12 of 19) households mentioned this reason. The lack of coverage of extension services seems to be high in general but applies especially for poor households. As other, less indicated hindering factors were reported financial and time constraints, which make up 8 % of the given reasons.

Table 11.3: Reasons for no recent agricultural support

	No offer / opportunity	No interest	Not affordable	Time constraints	Total number of households
RP	12	4	2	1	19
EP	14	11	3	1	29
BP	7	0	0	0	7
RNP	15	13	0	0	28
Total	48	28	5	2	83

Source: Household survey

A further reason expressed is disinterest in agricultural support. Of 83 interviewed households, which are not obtaining agricultural aid, 34 % (28 of 83) stated they had no interest. These households are mainly non-poor or escaped poverty. One possible explanation could be that the disinterest in agricultural support results from the bad experiences, which farmers had with previous support measures. While being generally interested in financial support or the provision with inputs (e.g. new seeds, fertilizers and pesticides), some stated to be reluctant to invest much of their time in assemblies. Those peasants might rather see themselves as independent agricultural entrepreneurs, taking their own decisions.

Technical advice is somehow seen as undesired intervention in cropping decisions. Another explanation could be the misunderstanding of the question. While being asked about their needs in order to improve their living situation, at a later point of the interview, most of those farmers expressed several felt needs, including different types of agricultural support (11.5).

The main reasons for not receiving agricultural support differ among the communities. To have no offer for agricultural support applies for 57 % of the families (16 of 28) in Huayta Corral, for 53 % of the families in Aymará (16 of 30) and for 81 % of the families in Casabamba (13 of 16). To have no offer or opportunity is the most important reason for the absence of agricultural support, except in the case of Ñuñunhuayo. The lack of interest in agricultural support makes up 37 % (11 of 41) in Aymará, 36 % (10 of 32) in Huayta Corral, 13 % (4 of 30) in Ñuñunhuayo, and 18 % (3 of 17) in Casabamba of the mentioned explanations. (For more details, Annex XIII).

11.3 Participation in Training Sessions on Agriculture

In comparison to the low rates of agricultural support for the households in general, the number of farmers that took part in agricultural training courses or workshops during the last 15 years are higher for all categories of well-being and for all communities (Figure 11.2). Fifty five percent of the interviewed farmers (66 of 120) participated in training sessions. A complete list of agricultural training for each community is displayed in Annex XIV – Annex XVII. The agricultural training does not necessarily take part in the communities themselves, but also in other communities or at the places where the organizations have their local offices. This might explain why some organizations were mentioned only once or twice by the farmers.

Households that escaped poverty or remained non-poor participated more in agricultural training than households, which remained poor or became poor. Godtland et al. 2004 confirmed a positive association between knowledge and productivity. Thirty three percent of the households that remained poor (7 of 21), 68 % of the households that escaped poverty (32 of 47), 22 % of the households that became poor (2 of 9), and 58 % of the households that remained non-poor (25 of 43) attended training in agriculture.

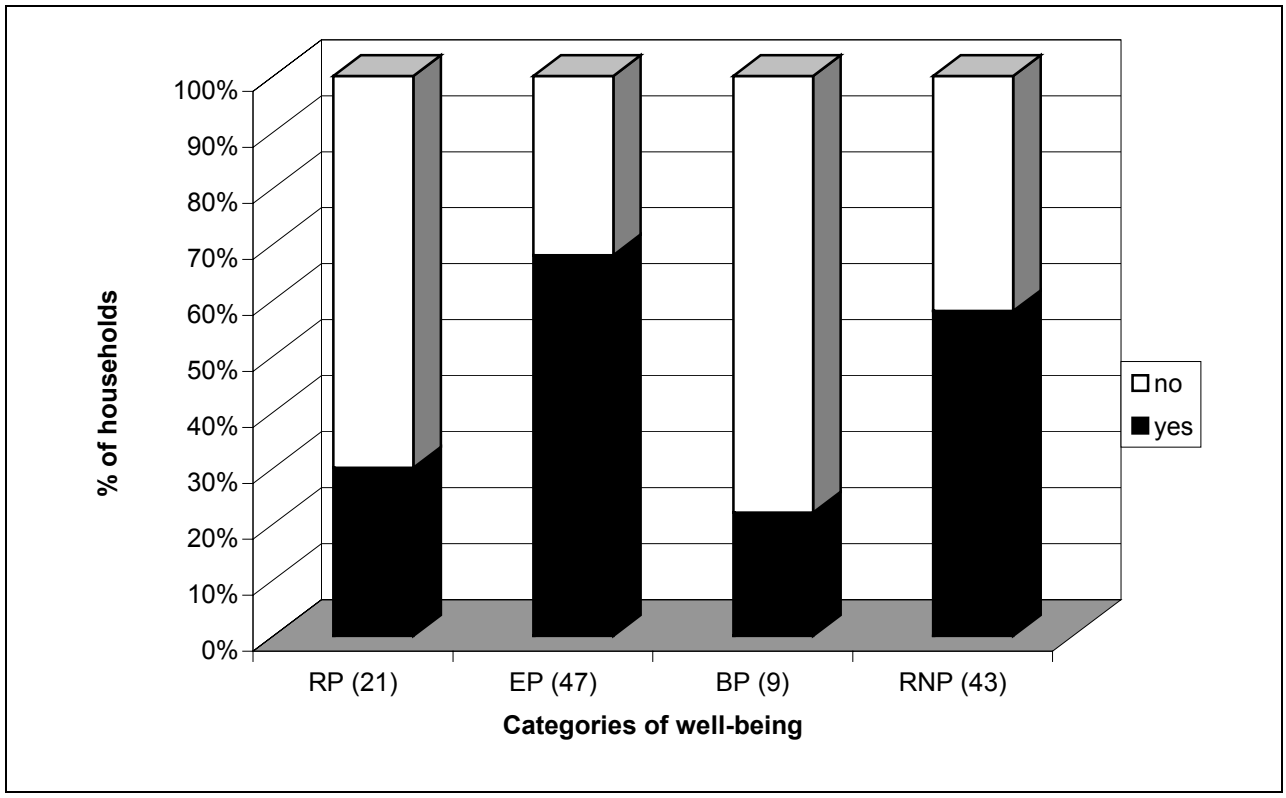

Figure 11.2: **Participation in agricultural training per categories of well-being** (Household survey)

It is remarkable though that also households, which remained poor and became poor participated in agricultural training. This means that knowledge is not enough to adopt and benefit from new technologies (Ortiz, 2001). The access to training, therefore, seems to be easier than to other forms of agricultural support.

In **Huayta Corral,** 53 % of the families (17 of 32) participated in agricultural training during the last 15 years. Seven different organizations that provided farmers with training during the last fifteen years were mentioned in the household survey in Huayta Corral. All farmers participated in two training sessions given by PRONAMACHCS (17 families). One training given by PRONAMACHCS helped the farmers to establish a new system for the selection of potato seeds. The training was done through field observations and exchange of knowledge with other communities. Five families participated in a training given by CARITAS. Three farmers took part in a training provided by the Ministry of Agriculture (MINAG). Further organizations, mentioned once each for the provision of a training session, were CIP, INIEA, CARE, and FONCODES.

Agricultural training sessions were attended by 41 % of the families (17 of 41) in **Aymará**. Most of the people in Aymará participated in agricultural training sessions offered by INIEA (8 households), CIP (7 households), and

PRONAMACHCS (7 households). Furthermore, SENASA, MINAG, and SEPAR were indicated each once as organizations that provided capacity building. The training sessions helped to improve potato production in general.

The picture of the participation in agricultural training sessions in **Ñuñunhuayo** is quite similar to the recent agricultural support given there. The number of interviewed households participating in the training sessions is with 80 % (24 of 30) very high. Mainly CIP and PRONAMACHCS provided the training, 18 interviewed households indicated their participation in activities from both organizations. In addition, the farmers indicated training sessions held by SENASA, MINAG, and INIEA.

In **Casabamba** 47 % of the households (8 of 17) participated in training sessions or workshops on agriculture during the last 15 years. This is remarkable, because only one interviewed household has mentioned having recent agricultural support. However, access to agricultural services seems to have decreased in Casabamba. Organizations referred to that provided training sessions in Casabamba, are PRONAMACHCS, CIP, INIEA and TALPUY.

11.4 Farmers Interest to Adopt New Technologies

The interest to work with new cultivation methods, such as for example pest management, crop diversification, mixed cropping, use of different fertilizers or different rotation systems, is in all communities very high (Table 11.4).

Few cases of no interest in new cultivation methods were mentioned in Aymará (4 of 41), Huayta Corral (1 of 32) and in Casabamba (1 of 17). Four of those six families having no interest in new cultivation methods were poor 15 years ago and are poor now.

Five of the 120 households have no interest in working with new native potato varieties; three of them in Aymará. Two of those households have insufficient land as well as heavy input constraints such as the lack of work force. Seven percent of the households (8 of 120) have no interest in working with new varieties of improved potatoes.

Table 11.4: Interest to work with new cultivation methods and new varieties

	Number of households with:						
		Interest to work with new cultivation methods		Interest to work with new varieties of native potatoes		Interest to work with new varieties of improved potatoes	
	Total	Yes	No	Yes	No	Yes	No
Huayta Corral	32	31	1	32	0	31	1
Aymará	41	37	4	38	3	38	3
Ñuñunhuayo	30	30	0	29	1	27	3
Casabamba	17	16	1	16	1	16	1
Total	120	114	6	115	5	112	8

Source: Household survey

11.5 Perceived Needs (with Emphasis on the Provision of Agricultural Support) of Potato Producers

Most of the interviewed farmers expressed several felt needs. The felt needs expressed are similar for the poor households and the non-poor households. Households that remained poor and became poor are mainly requesting agricultural inputs, such as fertilizers, pesticides, and seeds (Figure 11.3). The request for inputs makes up over 50 % in both categories. The need to obtain an agricultural credit was expressed by 19 % of the farmers that remained poor.

Representatives of households that escaped poverty or remained non-poor also request agricultural inputs (30 % of the households that escaped poverty and 40 % of the households that remained non-poor), but are more interested in capacity building, such as technical help and agricultural training sessions in new cultivation methods. The non-poor also mainly request advice in regard to commercialization. The need for livestock breeding support applies especially for households that escaped poverty.

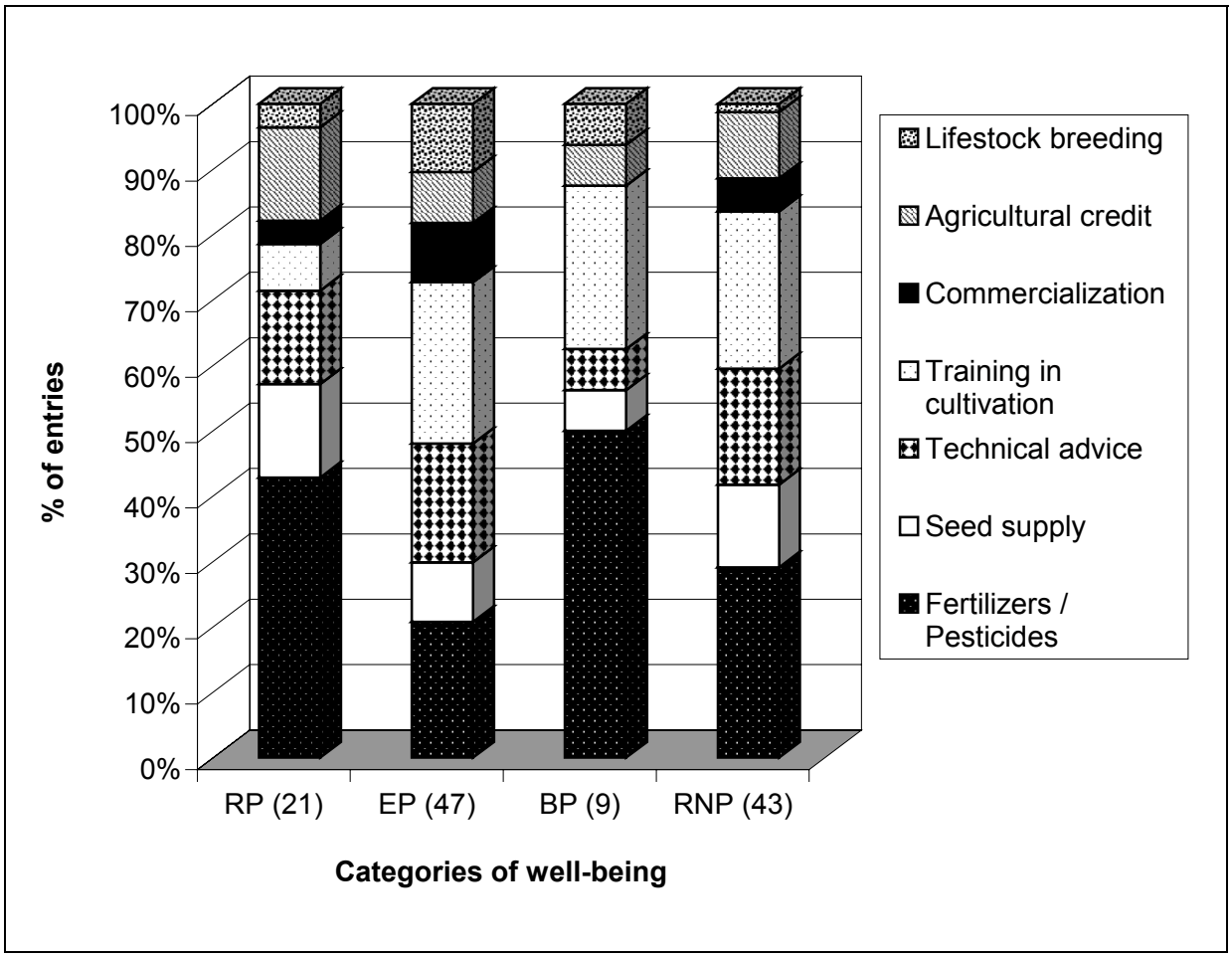

Figure 11.3: Farmers' felt needs in different well-being categories (Household survey, total number of entries: 202)

The needs expressed by the farmers are similar for the communities (Table 11.5). Agricultural inputs are requested by 41 % (82 of 202) of all households. The wish to get fertilizers and pesticides was mentioned by 30 % of the farmers (60 of 202). New potato varieties and seeds are purportedly needed by 11 % (22 of 202) of the households.

The wish for agricultural training sessions is high, as well as the need for agricultural credit. Interest in technical help is in all communities high, besides Ñuñunhuayo where the technical assistance given by organizations such as CIP and PRONAMACHCS is frequently high and considered in general to be very good. Interest in commercialization support is high, besides in Casabamba, where this was not mentioned.

Table 11.5: Farmers' felt needs in different communities

	Huayta Corral	Aymará	Ñuñun-huayo	Casa-bamba	Total
Fertilizers / pesticides	14	19	16	11	60
New potato varieties / seeds	5	4	9	4	22
Technical help	13	11	5	6	34
Training / workshops in cultivation	9	13	12	10	44
Commercialization	4	2	6	0	12
Agricultural credit	6	7	4	2	19
Livestock breeding support	4	1	5	1	11
Total	56	57	57	32	202
No need expressed	1	6	0	1	8

Source: Household survey, total number of entries = 202

Felt needs were mainly expressed according to the type of agricultural support farmers have already experienced in their communities. This corresponds to the findings of Bentley, Thiele et al.: "It is difficult for many people, including poor farmers, to define all the new technology they need before they have seen it, either because they do not perfectly understand the agricultural problem or because they cannot imagine all the possible solutions. The demand for such technology is 'implicit'" (Bentley, Thiele et al. 2004: i).

The results of what type of support farmers request from institutions working in the area of potato is quite similar for the well-being categories, like the felt needs expressed. The results are shown aggregated for all categories of well-being. The requests for technical inputs (pesticides, fertilizers and new seeds) make up 23 % of the entries (Figure 11.4).

Most of the support requested from institutions working in the area of potato refers to agricultural training, either specified such as information on pest management (9 %), or unspecified (32 %). Help in commercialization is requested from 10 % of the interviewed farmers. A complete table of the expressed requests by poverty categories can be found in Annex XVIII.

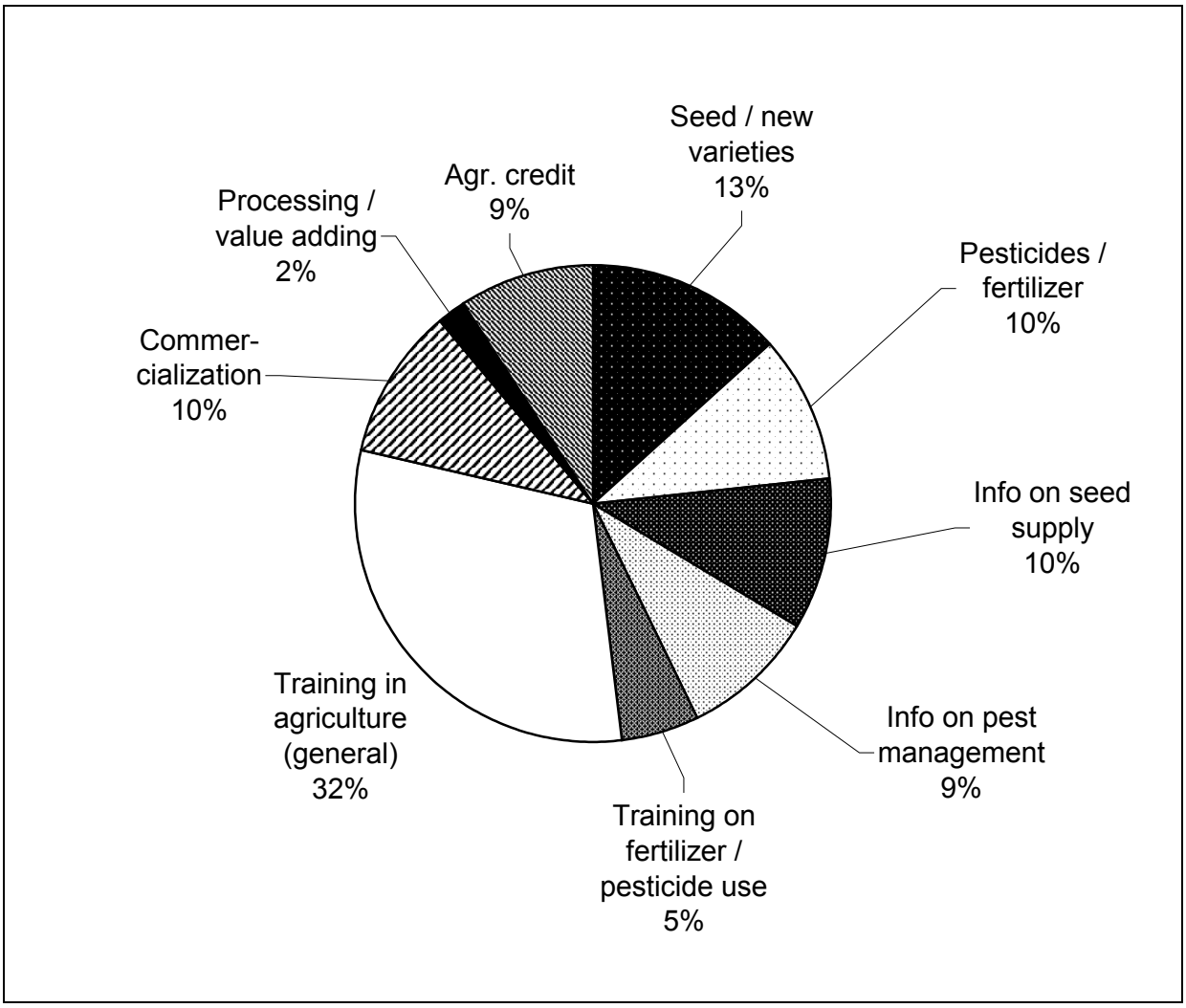

Figure 11.4: Agricultural support requested from institutions working in the area of potato (Household survey, total number of entries = 208)

Table 11.6 shows the agricultural support requested by the farmers of the different communities from an institution working in the area of potato. While all of the interviewed peasants are interested in training, community members of Aymará showed special interest in training about good seeds.

Some farmers expressed their worries about the lack of information on the results of participatory investigations, undertaken by research organizations like CIP. The diffusion of new technologies is considered to be sometimes inopportune, it was mentioned that not all of the canvassed farmers can or want to make use of the new technologies. Limited institutional relations (e.g. for further consultations) could be one reason for that.

Table 11.6: Agricultural support requested from an institution working in the area of potato

	Huayta Corral	Aymará	Ñuñun-huayo	Casa-bamba	Total
New potato varieties / seeds	4	10	10	4	28
Information about good seeds	7	11	3	1	22
Info on pest mangement	4	6	5	3	18
Pesticides / fertilizers	4	4	11	2	21
Training on pesticides / fertilizers use	1	3	4	3	11
Training in agriculture	15	18	18	10	61
Commercialization	9	8	4	1	22
Processing / value adding	1	2	1	0	4
Soil conservation	0	0	2	1	3
Agricultural credit	9	3	4	2	18
Total	54	65	62	27	208
No aid requested	1	3	0	2	6

Source: Household survey, total number of entries: 208

In conclusion it can be stated that agricultural support measures are often selectively applied in the communities. Poor households have less access to agricultural support in general and different needs than households that are better off. Felt needs of the farmers differ for the well-being categories. Poor households have more requests for agricultural inputs than for time-consuming training sessons. Special care has to be taken to consider the different needs of the farmers in the different categories of well-being if agricultural support measures are to improve the living standard of whole communities.

12 Main Findings and Intervention Opportunities

The main purpose of the current study is to contribute to CIP's understanding of poverty in the Central Highlands of Peru and to support the institution in their efforts to reduce poverty. Referring to the Livelihood System Approach, institutions can contribute to reduce the vulnerability of households to shocks, seasonal events and trends, to improve the availability of assets to households, to influence policies, structures and processes and to support households in the coping and adaption strategies that will improve their options (4.2). For CIP this means that it further needs to integrate its technical interventions related to the potato crop into wider approaches aiming at improving the situation and competitiveness of the small scale farmers' livelihood system as a whole.

12.1 Potato Production

As a general trend, it was observed that farmers in Huayta Corral, Aymará and Ñuñunhuayo now grow larger quantities of native and improved potato varieties than 15 years ago. Reasons stated for the increase are mainly more home consumption and better prices for certain varieties among native and improved potatoes. Farmers in Casabamba are nowadays more oriented to gain off-farm income in comparison with the other three communities and therefore potato for sales play a minor role and are grown on less farm area. However, potato cropping is still important for peasants in Casabamba in order to gain some independency from from food purchases on markets.

Farmers faced fluctuations in yields over the last 15 years. The main reasons mentioned by the farmers for good yields were good weather conditions, training workshops especially in pest management, as well as an increased use of fertilizer, pesticides and improved potato varieties. The main reasons for low yields were unfavorable weather conditions; in particular the phenomenon of *El Niño* inflicted problems on the farmers with heavy rainfalls and consequently a higher incidence of potato diseases.

Potato production, however, is influenced by more factors including fertilization, pest management, irrigation, seed supply, and mechanization (8.2). Many of these factors are related to the use of technologies that can improve farmers' competitiveness.

12.2 Poverty Perception

Communities have their own perception of poverty and well-being (9.1). In addition to monetary aspects, this perception also includes non material considerations such as family relationships and communal organization, i.e. assets related to social capital.

The placement of the poverty-line, and also the nature of the criteria below, did not vary much in all four communities. Some differences did arise in the manner in which different communities ordered the first criteria of well-being, but still in all communities – among other criteria - basic education, basic health, basic clothing, and basic food were mentioned. As long as people are struggling to meet their basic needs they are considered to be poor. After the basic needs are met, in all participating communities the poverty-line was drawn, which means that a way out of poverty is possible only if the basic needs are satisfied.

12.3 Incidence, Dynamics and Causes of Poverty

According to the poverty line which was jointly agreed upon, more than 60 % of the households in all communities are considered to be non-poor (9.2). This surprisingly high share displays the poverty perception of the community members; conclusions about the absolute poverty status in the participating communities should not be drawn from this. Different results would be gained by using other approaches and different indicators to assess poverty (4.1.2).

In terms of their well-being, the farm households have been divided into four different categories: Households which remained poor, those which escaped poverty, households which became poor and those which remained non-poor in the time period of the last 15 years. Well-being can be understood as an overall outcome for small farmers' livelihood systems (4.2).

In all communities, the number of households that have escaped poverty is higher than the households that became poor during the last 15 years (Table 6.1).

With regard to poverty and gender, the collected data suggests that poverty in the participating communities has a female face. Almost all households that became poor as well as about the half of households that remained poor are headed by women. Female community members with small children, who have

been abandoned by their partners, also belong to this group. On the other hand only 8 % of the households that escaped poverty and 5 % of the households that remained non-poor are headed by women.

Movement out of poverty seems to be related to the livelihood strategies a household follows. Such strategies depend on the respective asset endowment of a household (9.5.2). Hence an analysis on the asset level provides valuable information on factors influencing poverty as well as on the movement out of poverty.

Financial Assets [F]:

Regardless of which category households belong to, in general they have access to very limited financial resources: The average cash expenditures in all households are below US$ 1 per capita and day (9.5).

Access to formal credit significantly differs between the categories: Almost no household that remained poor or became poor received a credit in the last 15 years. Households that escaped poverty had more access to credits: 40 % received a credit in the last 15 years as did households that remained non-poor, every fourth household in this category received a credit in the last 15 years (9.5). It is a characterizing feature of the remaining non-poor category that they have the highest share of households with access to off-farm income (9.5 and 10.1.2).

Human Capital [H]:

Education plays an important role when it comes to poverty. No access to education is a major reason for poverty: More than 60 % of the household heads that remained poor or became poor did not attend classes at all or did not finish primary school. On the other hand, the heads of the households that remained non-poor are the most educated: Only 30 % of the household heads did not attend or at least did not finish primary school, for households that escaped poverty the figure is similar (Figure 9.2).

The size of the family and hence the dependency rate matters. This rate is higher for households that remained poor than for households in any other category. For households that became poor, the dependency rate is rather low, because almost half of the households in this category receive financial support by family members (Table 7.4 and 9.5).

Advanced or old age is also an important factor for becoming or remaining poor. Heads of households in these categories were much older than in the others. In other words: Heads of households that escaped poverty or remained non-poor are much younger than in the other categories: 40 % are 35 years old or younger. Only every fourth household head that remained poor is 35 or younger. Almost no household head that became poor is 35 years or younger (Table 7.3 and 9.5).

Health problems can be either a cause or a result of poverty. Almost 90 % of the households in the category of remained poor reported serious health problems such as respiratory and gastrointestinal diseases. In 60 % of families that escaped poverty and remained non-poor household members are suffering from serious health problems, which is still worrying but far less than in the other categories. Households that fell into poverty reported a comparatively good health situation, only roughly half of them face serious health problems. Health issues become decisive when it comes to nutrition security (7.2.2, 10.2 and 9.5).

Natural assets [N]:

Evidence suggests that no access to land indeed causes poverty, but on the other hand, access to land does not protect from poverty. Households that remained poor have least access to land, but households that escaped poverty and families that became poor have access to almost the same size of land. Constraints to escape poverty were rather a lack of capital investment, lack of available labor and of agricultural means of production. Households that remained non-poor have larger plots. Concerning the quality of soils some differences did arise: One third of farmers that escaped poverty declared their soils to be fertile, which is more than twice a big share as in the other categories of well-being (Figure 9.2 and 10.1.3).

Social Assets [S]:

Community organization matters. Mutual help and the capacity to act collectively are two of the outstanding characteristics of the participating communities. Mutual help and community organization were often referred to as contributing to people’s well-being. Interventions supporting and strengthening communal organizations are likely to benefit all categories of well-being and especially the poorest households if the community performs safety net functions (6.2 and 9.5).

Physical assets [P]:

Some differences in the categories of well-being did arise, especially concerning the agricultural means of production. Households that remained non-poor and those that escaped poverty possess more means of production then households which remained poor. Households that became poor often still own those production facilities, but what they are actually lacking of is an available labor force. In this context, inheritance plays a major role (9.5).

12.4 Livelihood Strategies

12.4.1 Coping and Adaptation Strategies

To understand the context of vulnerability (4.2.1) in the different categories of well-being in the four participating communities, households were investigated in relation to their coping and adaptation strategies during seasonal events, shocks and trends (9.6).

An overall finding in the four participating communities is related to the importance of livestock for coping and adapting to shocks and seasons. Besides being an important source of income (10.1.1), livestock plays an insurance-like function for farmers in all categories of well-being: In times of good harvests and relatively high potato prices, animals are bought in order to be sold in meager times. Since farmers who remained or became poor possess less and smaller animals (9.5) as well as less assets, they are far less “insured” than farmers who escaped poverty or remained non-poor. In other words, they are far more vulnerable to shocks, such as crop failure or illness and seasonal events like low potato prices. This is why for the poor, a major long-term adaptation strategy is investment in livestock. Among the non-poor, the share of households who mentioned investment in potato production and cropping inputs, in addition to livestock, as an appropriate adaptation strategy is much higher than among the poor (9.6).

12.4.2 Long-term Strategies to Improve the Well-being

The assets which a household can access are an important precondition, but not the only decisive factor for escaping poverty (9.5). In the participating communities, the main reasons contributing to escaping poverty were related to certain combinations of assets (livelihood strategies) a farm household pursues in order to gain livelihood outcomes.

The intensification of potato production was mentioned by the farmers as important strategy to improve their living situation (9.6.4). However, increased potato production alone did not necessarily pave the way out of poverty, it had to be associated with a market-oriented strategy (10.1.2). The role of potato production for getting out of poverty is illustrated by the fact that more than 70 % of the farmers who escaped poverty stated that (investment in) potato production played the major role for the improvement of their living situation.

Besides fulfilling an insurance-type function (10.1.1), livestock breeding also plays a prominent role in generating income for small farm households and hence for improving their well-being. Throughout all categories more than 60 % of the interviewed farmers mentioned livestock as the second most important source of income. An average of 10 % even responded that livestock is the most important source of income. “Small livestock” rather is for home consumption than for market sale. Since “big livestock” mainly serves as draft or pack animals, farmers, when talking about livestock as an income source, mainly refer to wool and meat producing “medium animals”[96]. On average, non-poor farmers (EP, RNP) possess far more livestock than farmers who remained poor. Farmers who became poor rank between these two extrema (10.1.1).

A diversified crop production contributes to buffer effects of crop failures or low potato prices to farm households (10.1.5). Today, farmers crop in shorter rotation-fallow-cycles but are more diversified (8.2). Similarly, farmers throughout all categories of well-being, who were interviewed about the increase in potato production, all mentioned that they produce more diverse crops than 15 years ago. Typical crops are e.g. *maca, mashua* and *ulluco.* Market orientation, also in these cases seems to be a key strategy for escaping poverty.

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[96] “Small livestock” subsumes animals like chicken or guinea-pigs. “big livestock” are cattle or horses. In the “medium livestock” category fall sheep, pigs, alpacas or lamas.

12.5 Agriculture and Livelihood Outcomes

12.5.1 Well-being

Agriculture and especially potato production (10.1) play a crucial role in all four categories of well-being. Farmers who remained non-poor and those who escaped poverty, can be distinguished in many characteristics from households that remained or became poor.

No farmer who became poor gains income from economic off-farm activities. It is a characterizing feature of the remained non-poor category, that about one third of farmers conduct economic off-farm activities. The fact that the share of farmers with diversified incomes among those who escaped poverty is not much higher than among farmers who remained poor suggests that income diversification is a secondary strategy after having escaped poverty with help of on-farm activities – mainly market-oriented potato production (10.1.2). However, a diversified income base seems to protect from descent into poverty.

Pursuing a subsistence strategy in the participating communities seems to be associated with being poor. An exception is a considerable number of income-diversified non-poor farmers in Casabamba, which conduct agriculture only for home consumption. Escaping poverty and remaining non-poor on the other hand is clearly associated with an orientation to market production (10.1.2). The production strategy pursued, has implications for the types of technologies that farm households would need.

On average, poor farmers in the participating communities seem to have less access to fertile soils than non-poor farmers (10.1.3). Communal land is the basis for farmers who remained poor and those who escaped poverty. Acquiring extra private land seems to be a characterizing strategy of farmers who escaped poverty. Farmers who remained non-poor and became poor responded that they have mainly private land as basis of their production. Becoming poor does not seem to be caused by lack of land. What actually was lacking were financial assets in terms of investment capital, human assets in the form of a labor force and physical assets, meaning agricultural production facilities. However poor farmers in the participating communities seem to have less access to fertile land, than non-poor.

Almost all farmers rely on traditional storage systems for seed potato and home consumption. Storage for later market sale is not practiced. Supply of good quality virus-free seed is not guaranteed for farmers in the participating communities. Most farmers rely on their own seed selection or on exchange with other farmers. Purchases in the past 15 years were mainly conducted by farmers who escaped poverty. This can be related more to an extension of cropping area rather than to phytosanitary reasons.

It is characterizing for farmers who escaped poverty, that they crop more input intensive than farmers in all other categories of well-being: Among them the share of farmers who have access to irrigation, cultivate their land with help of animals or even tractors, use mineral fertilizers and pesticides is highest (10.1.6).

12.5.2 Food Security

Potato is the staple food for households in all categories of well-being: For households that remained poor it is almost the only food item. Non-poor households consume a more balanced diet including more protein in comparison to the households in the other categories of well-being (10.2).

But still, even households considered to be non-poor experience food shortages in the communities. Farm households in all categories of well-being in the past 15 years were highly vulnerable to sudden shocks, such as illness of family members, extreme weather conditions, high incidence of pests and diseases as well as to recurring low potato prices (9.6.3). In other words, they depended to such a degree on agricultural production (potato cropping), that major crop failure or low potato prices could cause income losses, which have led to food shortage or even hunger to the family.

Besides the supply of qualitatively and quantitatively sufficient food, the health situation is decisive when it comes to nutrition security. Health care staff in all communities stated that hygienic standards and consumption habits led to severe malnutrition especially in children (7.2.2). Even in communities that were better-off (Casabamba) and could afford a better diet, people were said to neglect especially children’s nutrition.

12.5.3 Sustainabilty of the Livelihood Systems of Small Scale Farmers in the Central Highlands of Peru

The experience in the participating communities revealed that farmers in the study region face two alarming trends:

- Decreasing potato prices due to overproduction and dominance of intermediaries in the marketing chains (8.3.2 and 10.3), and
- Increasing soil degradation and crop productivity losses, due to system intensification and reduction of fallow periods.

These two trends put small farmers' livelihoods in a vicious cycle, which results in a gradual decrease of farmers' incomes. If no appropriate measures are taken, this could end in a collapse of these livelihood systems in the study region (10.3).

12.6 Agricultural Support to Farmers

In the participating communities, mainly non-poor households had access to agricultural support. The households, which have received agricultural support, stated that the support has contributed to the improvement in their living standards (11).

Poor households have less access to agricultural support in general and have different needs than households that are better off. Households considered to be poor had more access to training than to other forms of agricultural support. Since a large number of poor households are constrained by the scarcity or non availability of assets, training alone has had very little implications for improving their situation.

The request for support often is expressed in accordance to the types of agricultural support farmers have already experienced. While the expressed needs were similar in the communities, the felt needs of the farmers differed for the well-being categories. Poor households have more requests for agricultural inputs, like fertilizers, pesticides and seeds, than for time consuming training. Households that escaped poverty or remained non-poor are generally more interested in capacity building, like technical advice in new cultivation methods. Support in commercialization, as well as the interest to obtain new potato seeds, is also predominantly expressed by the non-poor households.

12.7 Intervention Opportunities by Agricultural Research and Development Institutions

The methodological approach of the current study takes the multidimensionality of poverty into consideration (5). In a short-term perspective, single intervention measures can contribute to diminish some symptoms of poverty. However, to sustainably tackle poverty, an integration of different measures at different levels to a holistic approach is needed. This requires harmonized and complementary collaboration between numerous existing governmental, non-governmental and international organizations.

Based on the results of the current study, various entry points for research and development institutions could be identified to contribute to poverty alleviation in potato producing communities in the Central Highlands of Peru.

The study reveals that agricultural support measures are often applied selectively focusing on single farmers in the participating communities. This is especially true for research activities. Even when applying participatory research approaches (3.3), research and development institutions like CIP are somehow in a dilemma. At the end, scientists need good quality research data, which implies that assessment is being done with the “fittest”, most reliable or already known farmers. However, still being poor according to internationally-used indicators (4.1), those farmers in the context of their communities are characterized by a better endowment of assets such as better education, free labor capacities, better health, and the ability to have long term strategic planning. A pre-intervention assessment, which mirrors the endogenous perception and necessities on the community and individual level, could serve as a basis for the targeting of cooperating farmers (5).

Collaboration on the community level helps to strengthen the internal structures and supports the outstanding capacity of the highland communities to act collectively. It also enables institutions like CIP to integrate such households that besides being poor have little or no potential for progress due to their limited asset endowment, for instance non-availability of labor force. Those poorest of the poor need governmental social welfare or community support to improve their living situation. As the example of Ñuñunhuayo shows, intact community structures can help to also integrate the poorest. As a consequence, conducting research and disseminating the results in a way that supports the community

spirit, seem to contribute to poverty alleviation. Especially the Andean potato weevil as the most important biotic constraint in potato production in the Andes would require a community approach for its successful management.

Besides this, contributing to the progress of poor farmers (RP, BP) requires low input strategies. Since at present potato production, especially the production of good marketable, improved potatoes is mainly conducted in a input intensive way, poor farmers (RP, BP) are often excluded from it.

Particular types of technologies have different impact potential for improvements in the living situation of households in the four categories of well-being. For example late blight resistant potato varieties potentially contribute to maintain or increase productivity without additional costs, which is important especially for poor households (RP, BP) with high input constraints. However this must not cause a suppression of the high diversity of traditionally grown potato varieties. This biodiversity helps to protect farm households from biological, climatic and other shocks and stresses. Especially poor households are vulnerable to the loss of biodiversity, because they directly draw on the pool of resources available locally.

The importance of well-managed participatory pilot projects needs to be highlighted. Referring to crop diversification in Huayta Corral a successful project concerning *maca* has been reported (7.5). Still a major challenge remains the up-scaling of positive research results via capacity building and innovative communication networks.

The activities listed below were identified as being of high potential for poverty alleviation in the participating communities. These activities can contribute to diminish the vulnerability of households, to stabilize and improve the asset endowment or directly influence livelihood outcomes (4.2.1):

1. Activities which sustainably reduce the risk of crop failures, lower production costs and increase productivity contribute to increased nutrition security, help to diminish income fluctuations and lead to better competiveness of small scale farmers in the market:
   - Breeding and supply of pest-resistant and frost-tolerant varieties.
   - Development and dissemination of integrated pest management systems that combine traditional methods with innovations and reduce the need for chemical pesticides. Technological innovations and transfer of know-how to reduce the use of highly toxic pesticides contribute to decrease the health risks of households.
   - Development of innovative seed storage systems and seed selection methods that reduce the probability of virus infection or losses by insects such as the Potato Tuber Moth.
2. Activities that support the diversification of income generation, on-farm and off-farm, contribute to a stabilization and increase of household income. Livestock breeding can contribute to reduce the vulnerability of farmers to shocks and seasonal effects. More diversified food items for consumption increase food security:
   - Facilitation of market-oriented crop diversification.
   - Support and development of integrated crop-livestock systems. Introduction of new economic on-farm activities.
   - Introduction and support of alternative off-farm income-sources, e.g. eco-tourism.
3. Activities which enable value adding to potato and other agricultural products and strengthen the farmers' position in the marketing chains and increase their income. They are a basis for investment in the production system and self-generated innovation:
   - Development and dissemination of storage systems for ware potatoes that allows selling potatoes between the harvest seasons, when prices are higher.
   - Development and introduction of processing facilities, which allow value adding to potatoes and other crops in the communities, or facilitating the links with processing companies.
   - Development and implementation of marketing strategies for processed and unprocessed potatoes and other crops.
   - Enhancing the farmers' organization and improving their position in the marketing chains.
   - Initiate an increase of demand for potato (products) at national and international markets by marketing measures.

4. Activities that secure the natural resource base of the livelihood systems in potato producing communities of the Central Andean Highlands.
    - Development of locally adapted soil management strategies including anti-erosion measurements, soil analysis as basis for fertilization schemes and capacity building for a profound understanding of natural indicators and ecological interrelations of agro-ecosystems. Capacity building for integrated pest management.
    - Developing and implementing strategies for preserving the on-farm biodiversity of cultivated potato varieties and other crops at current high level.

As it is indicated, institutions have several entry points in order to contribute to poverty reduction. Since a livelihood is a complex interrelated system, holistic interventions are needed taking into account the heterogeneity of the poor.

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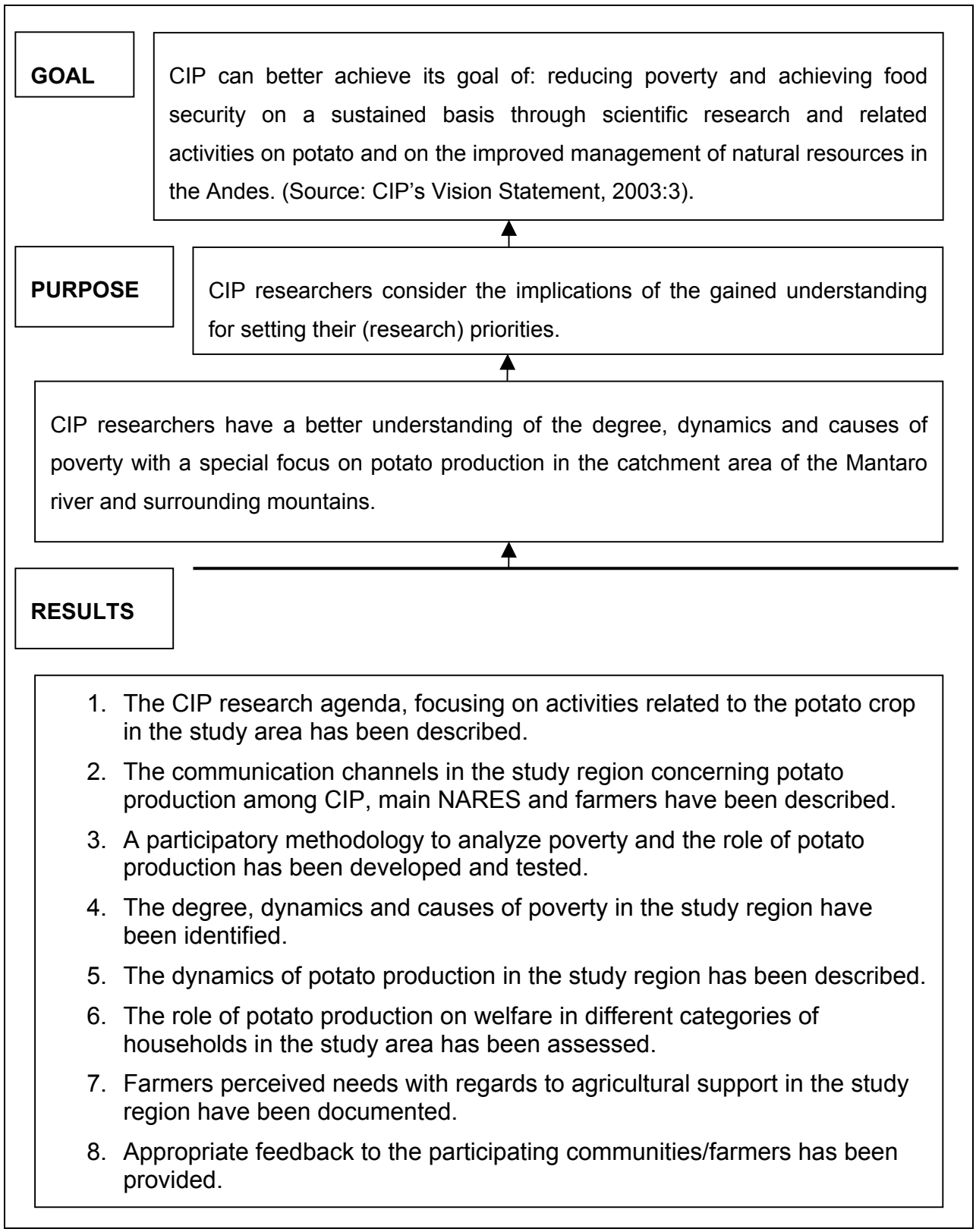
14 Annex

Annex I: System of objectives



Annex II: Composition of the team for the fieldwork

The SLE-Team was supported by the following Peruvian facilitators and interviewers for gathering the information at community level:

- Adan Vega, Entomology technician, CIP Huancayo, interviewer
- Alejandro Sanchez Ruiz, Agronomist, facilitator
- Alfredo Rios, Socioecologist, CIP, interviewer
- Ana Taipe Palomino, Agrarian technician, interviewer
- Armando Ramos Condor, Agrarian technician, interviewer
- Cesár León Alvarez, Agronomist, facilitator
- Cristina Fonseca, Agronomist, CIP Lima, interviewer
- Jessica Huaroc Orellana, Agronomist, CIP Huancayo, interviewer
- Manuel Cordova Galván, Agronomist, interviewer
- Marleni Condori Ayuque, Agrarian technician, interviewer
- Soledad Montoya Muñoz, Veterinary, facilitator
- Willy Pradell, Agricultural Economist, CIP Lima, interviewer

Annex III: Family list

Nombre de la comunidad: _____ Fecha: _____

No E.	Nombre del jefe de hogar	Edad del jefe del hogar	Sexo (M,F)	Desde cuando vive en la co-munidad	Fuente principal de ingreso		Destino de la pro-duccion agricola		Etapa de 15 años atrás	Etapa actual	Categoría
					Princi-palmen-te agricul-tura	Agricul-tura mas otras actividad es[97]	Para con-sumo propio[98]	Para la venta[99]			
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
1											
2											
3											

[97] practica agricultura para venta o consumo propio mas otras activitades afuera del campo

[98] practica agricultura para consumo propio (consume mas de 70 % de su produccion)

[99] practica agricultura para venta (vende mas de 70 % de su produccion)

Annex IV: Questionnaire for household survey[100]

Encuestador:_____Fecha:_____

DATOS DE IDENTIFICACION

1. Nombre del Jefe de Familia: _____

2. Nombre de la comunidad: _____

3. Distrito / Provincia / Departamento:_____

4. Su familia ¿ha vivido en la comunidad más de 15 años? [1] Si ; [2] No

5. Categoría del Encuestado: A B C D E

6. Estado de bien-estar: Hace 15 años
   Ahora

Motivos Mencionados en la Asamblea:

_____

DATOS SOCIO-ECONOMICOS DEL JEFE DEL HOGAR Y SU FAMILIA

7. Sexo [1] Masculino [2] Femenino

8. Edad: _____

9. Grado de Instrucción del jefe / jefa del hogar:
[1] Ninguno [2] Primaria incompleta [3] Primaria completa [4] Secundaria
[5] Superior / universitaria [6] Otros (especificar) _____

10. Grado de Instrucción de la esposa/o:
[1] Ninguno [2] Primaria incompleta [3] Primaria completa [4] Secundaria
[5] Superior / universitaria [6]Otros (especificar) _____

11. Número de personas que viven juntos en la casa de Ud. _____

12. ¿Aparte hay otras personas que dependen de Ud.?_____

_____

[100] Algunas partes de este cuestionario han sido tomadas de cuestionarios elaborados por Keller (2003) para un estudio sobre la produccion de papa en Junín, y de Krishna et al. (2005) para un estudio de pobreza en Puno y Cajamarca.

13. Número de personas que contribuyen a traer dinero al hogar _____

14. Número de hijos entre 6 a 18 años _____

15. Entre ellos ¿cuántos estudian (escuela/colegio o similar)? _____

16. Número de familiares directos que han cursado o cursan estudios superiores (____)

17. Ocupación principal del jefe de familia
[1] Empleado [2] Comerciante [3] Agricultor / Ganadero [4] Jornalero

[5] Combinación de los anteriores (especificar): ____ [6] Otros (especificar) ____

18. ¿Ud. es comunero activo? [1]Si [2]No

19. ¿Pertenece Ud. o algún miembro de su hogar a alguna organización de la comunidad? [1]Si [2]No

20. Si es así : a qué organización?
[1] asociación de mujeres [2] cooperativa de comercialización [3] asociación de padres [4] grupo de vaso de leche [5] comité de regantes [6] comité de productores [7] otra:_____

21. ¿Qué lengua habla Ud.?
[1] español [2] idioma nativo / quechua [3] combinación

DINAMICA DE PRODUCCION DE PAPAS Y EMPRESA AGRICOLA

22. Superficie total de su terreno: _____Ha

23. ¿Qué porcentaje de su terreno utiliza Ud. por lo general para?:
[1] pastoreo____% [2] cultivo ____% [3] descanso_____% [4] otro _____%

24. Cuanto de su campo es:
[1] Propiedad privada_____% [2] Alquilado_____%
[3] Propiedad comunal_____% [4] otro_____%

25. ¿Hay sistema de riego? [1] Si [2]No

26. Si es así, ¿qué porcentaje de su terreno total tiene por lo general riego? Porcentaje con riego:_____%

27. Ud. tiene animales? [1] Si [2] No

Si es así cuáles:

Tipo de animal	**Cantidad hoy**
Ganado vacuno	
Ovejas criollas / mejoradas o puras	
Alpacas / Llamas / Mulas / Burros / Caballos	
Aves de corral	
Cuyes	
Cerdos	
Abejas (colmenas)	
Otros	

28. ¿Qué cultivos (más importantes) sembró Ud. en la ultima campaña en sus chacras?

Cultivos	**Porcentaje de terreno utilizado por:**	**Sacos cosechados(sacos de 80 KG)**

29. ¿Cuáles fueron los cultivos (más importantes) de sus chacras hace 15 años es decir al fin del gobierno de Alan García?

Cultivos	**Porcentaje de terreno utilizado por:**	**Sacos cosechados(sacos de 80 KG)**

30. Si siembra hoy más papa nativa que hace 15 años, ¿por qué siembra más?

[1] Bajos precios de insumos [2] Mejores precios/ demanda de papa nativa [3] Mejor acceso al mercado de insumos [4] Mejor acceso al mercado de papa nativa [5] Más crédito agrícola [6] Más apoyo agricola [7] Más consumo propio [8] Para satisfacer las necesidades basicas / dinero [9] Uso de otras / nuevas variedades de papa nativa [10] Otros _____

31. Si siembra hoy más papa mejorada que hace 15 años, ¿por qué siembra más?

[1] Bajos precios de insumos [2] Mejores precios / demanda de papa

mejorada [3] Mejor acceso al mercado de insumos [4] Mejor acceso mercado de papa mejorada [5] Más crédito agrícola [6] Más apoyo agricola [7] Más consumo propio [8] Para satisfacer las necesidades basicas / dinero [9] Uso de otras / nuevas variedades de papa nativa [10] Otros_____

32. Si siembra hoy menos papas nativas que hace 15 años, ¿ por qué siembra menos?
[1] Altos precios de insumos [2] Peores precios/ demanda de papa nativa [3] Peor acceso al mercado de insumos [4] Peor acceso al mercado de papa nativa [5] Menos crédito agrícola [6] Menos apoyo agricola [7] Menos consumo propio [8] Otras fuentes de ingreso para satisfacer las necesidades basicas [9] Uso de nuevas variedades de papa mejorada
[10] Otros____

33. Si siembra hoy menos papas mejoradas que hace 15 años, ¿ por qué siembra menos?
[1] Altos precios de insumos [2] Peores precios / demanda de papa mejorada [3] Peor acceso al mercado de insumos [4] Peor acceso mercado de papa mejorada [5] Menos crédito agrícola [6] Menos apoyo agricola [7] Menos consumo propio [8] Otras fuentes de ingreso para satisfacer las necesidades basicas [9] Uso de nuevas variedades de papa nativa [10] Otros_____

34. Cuáles son las ventajas de sembrar papas mejoradas?
[1] más rendimiento [2] menos plagas [3] otros_____

35. ¿Por qué no siembra papas mejoradas?
[1] no tiene acceso [2] nativas tiene mejor mercado / precio [3] demasiado caro [4] otro_____

36. ¿Cuantas veces ha comprado Ud. semilla de papa en los últimos 15 años?
___ veces.

37. ¿Qué hace Ud. con su cosecha (de papas)?
[1] consumo propio_____% [2] venta_____%
[3] semilla_____% [4]otro_____%

38. Si vende: ¿En qué epoca del año vende y a quién vende?

Cultivo	¿Cúando? ¿En qué mes?	¿A quién? (marcar con X)			
		en chacra	mayorista	minorista	otra
Lista de cultivos					

39. ¿De dónde recibe Ud. informaciones sobre los precios de papa que vende en los mercados?
[1] de la radio [2] informaciones de otros campesinos
[3] de mayorista [4] MINAG [5] otras fuentes de información_____

40. ¿Quiénes y cuántas personas trabajan en su chacra en una campaña normal?
[1] miembros de la familia:_____ personas
[2] intercambio / ayuda / ayni / minca entre miembros de la comunidad _____personas
[3] trabajadores asalariados / pagados _____NS por persona diario_____
[4] otra forma_____

41. ¿Cuáles miembros de su familia tienen la responsibilidad de su producción agrícola?

Producción agrícola	Hombre	Mujer	Ambos	Niño
Ganado				
Las 4 cultivos más importantes				

42. Por favor, describa su sistema de rotación de cultivos en una parcela:
¿Con cuál cultivo empieza? [1] _____
¿Cuáles cultivos / descanso (duración) siguen?
[2] _____[3] _____[4] _____[5] _____[6]_____
[7]_____[8]_____[9]_____

43. ¿Cuál es la calidad promedio del suelo de su terreno en comparación con el suelo de los otros communeros?
[1] fértil [2] medio [3] poco fértil

44. ¿Empeoró la fertilidad de su terreno / de los suelos en los ultimos 15 años? [1] Si [2] No

45. ¿Si empeoró la fertilidad, ¿cuáles son las causas principales?

[1] erosion [2] deficiencia de fertilizantes [3] uso de fertilizantes [4] uso pesticidas [5] otros _____

46. ¿Cómo efectúa el cultivo de papas en los diferentes periodos de cultivo?

	A mano / chaquitajlla	**Con animales**	**Con tractor**
Preparación de suelo			
Sembrar			
Deshierbo			
Aporque			
Cosecha			

47. ¿Utiliza fertilizantes? [1] Si [2] No

48. Si utiliza fertilizantes, ¿cúales utiliza?

Tipo de fertilizante	**para la papa (cantidad en litros/kilos/sacos) por vez**	**Cuantas aplicaciones en la última campana en su campo principal**

49. ¿Qué plagas / enfermedades afectan a la papa en su chacra?
[1] gorgojo [2] rancha [3] polilla [4]escarabajo de hojas [5] otro_____

50. ¿Utiliza pesticidas? [1] Si [2] No

¿Contra que plaga?	**Tipo y nombre del producto**	**¿Cuántas aplicaciones?**	**Cantidad por aplicacion (kg / litros)**	**¿A quién compra?**

51. Aparte de utilizar pesticidas, ¿cómo controla Ud. las plagas / enfermedades de la papa?
[1] trampas [2] muña / hierbas (ajo, ají, tanwi, eucalipto...) [3] otros_____

52. ¿Qué tipo de almacén de papa utiliza su familia para consumo familiar?

[1]troja [2] ichu [3] en su casa / terrado [4] quedan en la chacra [5] en la tierra (hueco) [6] otros_____

53. ¿Ud. almacena la papa para la semilla:
[1] comunal [2] individual?

54. ¿Qué tipo de almacén utiliza Ud. para el semilla de la papa?
[1] costales [2] tarimas [3] trojas [4] otros_____

55. ¿Qué parte de su cosecha de papa se estropea durante el almacenamiento?
[1] semillas_____% [2] consumo_____%

56. ¿Qué hace Ud. con papas malogradas?
[1] quedan en la chacra [2] consumo para animales [3] fertilizante [4] chuños [5] otros _____

57. ¿Cuáles son las 5 variedades de papa más importantes que siembra actualmente y que ha sembrado hace 15 años?

Variedades Nativas	**Hoy (Si/No)**	**Hace 15 años (Si/No)**	**¿De quién obtiene las semillas hoy?(1=selecion propia; 2=INIA; 3=tiendas comerciales; 4=mercado local; 5=comunidad; 6=otro)**

Variedades Mejoradas /semilla	**Hoy (Si/No)**	**Hace 15 años (Si/No)**	**¿De quién obtiene las semillas hoy?(1=selecion propia; 2=INIA; 3=tiendas comerciales; 4=mercado local; 5=comunidad; 6=otro)**

GASTOS Y RAZONES PARA MOVIMIENTOS EN LA SITUACIÓN ECONOMICA Y SOCIAL

58. ¿En qué gasta Ud. dinero (en promedio)?

Gastos promedio por semana (NS)		
Comida		
Transporte		
kerosene/leña/gas (para cocinar)		
articulos higienicos		
Gastos promedio por vez (NS) ¿Cuántas veces por año?		
Ropa		

educación (incl. materiales educativas)		
medicina/servicios de salud		
mantenimiento de la casa		
Luz		
Agua		
deudas/intereses		
entregas/cuotas		
Impuestos		
Otro		
	NS	

59. Bienes que la familia posee (Nota: Buscar la mejor introducción para obtener la siguiente información. Lee todas las respuestas y escribe la cantidad)

Bienes	**Ahora/ Número**	**Hace 15 años/ Número**
Radio		
TV /VHS/DVD		
teléfono/cellular		
Vehículo motorizado caro		
Motocicleta		
Bicicleta		
Máquina de coser		
cocina a kerosene		
Telar		
Molino		
Equipo para quesos		
Tienda / Negocio propio		
otras		
Innovaciónes agricolas	**Ahora/ Número**	**Hace 15 años/ Número**
Tractor		
Variedades/ semillas mejoradas		
Fertilizantes		
Pesticidas		
Mochila de fumigar		
Riego		

Arado		
Animal de carga		
Yunta		
otra		

60. ¿ Ud. recibe remesas/dinero de algún miembro de la familia que trabaja fuera de la comunidad? [1] Si [2] No

61. ¿Cuáles son sus 4 principales fuentes de ingreso, comenzando por la más importante? ¿Ahora y hace 15 años?

Fuentes de ingreso	**Ahora**	**Fuentes de ingreso**	**Hace 15 años**
	%		%
	%		%
	%		%

62. ¿Cuáles son las 3 principales actividades economicas de la mujer, comenzando por la más importante?
[1]_____[2]_____ [3]_____

63. ¿ A Ud. le han dado un préstamo / crédito en los últimos 15 años? [1] Si [2]No

64. Si es así, ¿quién le ha dado y cuantas veces?
[1] ¿un banco? _____ [2] ¿una asociación? _____(especificar) [3] intra familiar_____ [4] ONG_____ (especificar) [5] otros _____

65. Ahora por favor dígame en una palabra ¿cómo es su situación económica hoy en comparación con su situacion hace 15 años?
[1] mejor (sigue con 70-73) [2] peor (sigue con 74) [3] igual (sigue con 75)

66. Si su situación esta mejor ahora, por favor háble me en pocas palabras de los sucesos que ocurrieron y las cosas que hicieron los miembros de su familia que ayudaron a mejorar su situación.

_____

67. Para explicar las razones que permitieron mejorar la vida de su familia: ¿qué papel/ rol jugó la inversión en la papa?
[1] El más importante [2] Poco importante [3] Sin importancia

68. ¿Qué variedades de papas han contribuido más a este incremento? (1= el

más importante, 2= segundo en importancia, 3= tercero en importancia) [1]_____ [2]_____ [3]_____

69. Si no invirtió en la producción de papas, ¿en qué lo hizo y porqué? Invirtió en: _____
Razón de su elección (intente usar solamente una palabra):_____

70. Si su situación económica ha empeorado, háble me en pocas palabras de los sucesos que ocurrieron y las cosas que hicieron los miembros de su familia que empeoraron su situación.

_____

71. Si su situación económica no se ha cambiado en los últimos 15 años, háble me en pocas palabras de los sucesos que ocurrieron y las cosas que hicieron los miembros de su familia.

_____

72. ¿Durante los últimos 15 años, ha tenido que vender uno o más bienes materiales (terreno, su casa, activas) para cubrir alguna necesidad familiar?

Tipo	**Cantidad**	**Cuántas veces**

73. ¿Qué necesidades fueron estas? (indicar importancia: 1= más importante; 2= segunda más importante; 3= tercera más importante)
[1] Comida para la familia_____ [2] Invertir en un negocio_____
[3] Necesidades de salud _____ [4] Educación _____
[5] Matrimonio _____ [6] Fallecimiento _____
[7] Vestimenta _____ [8] Cosas de la casa (muebles, cocina, etc) ____
[9] Relacionado a la vivienda _____ [10] Ceremonias /festividades _____
[11] Otros gastos (listar) _____

74. ¿Cómo habría cubierto estas necesidades, si no hubiera tenido bienes para vender?
[1] Préstamo de dinero [2] Vendiendo otros bienes [3] Reducción de gastos
[4] Reducción del consumo familiar [5] Otros (listar) _____

75. En este año los precios de la papa estan muy bajos en comparación al año anterior. ¿Cómo Ud. maneja la perdida del ingreso?

[1]_____[2]_____[3]_____

76. ¿Cuáles son los factores más importantes que le han impedido aumentar sus ingresos o mejorar su nivel de vida? (indicar importancia: 1= más importante; 2= segunda más importante; 3= tercera más importante)
[1] No tener acceso a crédito formal _ [2] No tener acceso a crédito informal ___
[3] Restricciones de alimentación _____ [4] Restricciones de mercado _____
[5] Restricciones de sanidad _____ [6] Desconocimiento _____
[7] Otros (listar) _____

77. Si tuviera S/.500 adicionales, ¿en qué invertiría? (en orden de importancia)
[1] _____ [2] _____ [3] _____

78. Tomando en cuenta su experiencia de los ultimos 15 años, ¿dónde ve Ud. potenciales/ posibilidades para mejorar su nivel de vida?
[1] _____ [2] _____ [3] _____

79. Principalmente, ¿cuántas veces al día comen los miembros de su familia una comida?

Ahora	**Hace 15 años**
[1] Una vez al día	[1] Una vez al día
[2] Dos veces al día	[2] Dos veces al día
[3] Tres veces	[3] Tres veces
[4] Más que tres veces	[4] Más que tres veces

79. Imagínense una semana normal, ¿qué come/toma Ud. normalmente? Además, ¿cuántas veces lo come/toma?

¿Qué come?	**¿Cuántas veces por semana ahora?**	**¿Cuántas veces por semana hace 15 años?**	**¿Qué toma?**	**¿Cuántas veces por semana ahora?**	**¿Cuántas veces por semana hace 15 años?**
Huevos			Agua de caño/arroyo		
Carne/ pollo/ pescado			Té /café/ infusión de hierbas		
Frijoles/ habas			Leche		
Verduras			Gaseosas		
Frutas			Otros		

			bebidas		
Papas/ARTs					
Arroz Pasta					
Otro					

80. ¿Cuántas veces y cuánto tiempo Ud. no ha tenido suficiente comida para toda la familia en los ultimos 15 años?
[1] cuantas veces_____ [2] cuánto tiempo promedio _____

81. Sí es así, ¿cuáles son los 3 razones más importantes? (indica importancia: 1= más importante; 2= segunda más importante; 3= tercera más importante)
[1] perdida de cosecha_____ [2] falta de dinero_____ [3] salud_____
[4] robo_____ [5] otro_____

82. ¿Cómo se manejaron en esas épocas con menos comida? ¿Cuáles son sus estrategias hasta que la próxima cosecha viene?
[1] prestar del vecino [2] vender un bien [3] otro_____

83. ¿Ud. o algún miembro de su familia ha tenido enfermedades graves en los últimos 15 años?
[1] No ; [2] Si ; Sí es así especificar:
[1] diarreas [2] tuberculosis [3] enfermedades respiratorias
[4] enfermedades del estomago [5] enfermedades de la piel
[6] impedimento fisico [7] impedimento psíquico [8] otras_____

APOYO AGRICOLA

84. Participó algún miembro del hogar en un curso especial sobre agricultura?
[1] Si [2] No

85. Si sí, ¿de qué entidades y qué temas agrícolas cubrió este curso?

Curso realizado por...	**Temas**	**¿Le ha sido útil? (si / no)**

86. Ud. obtiene apoyo agrícola? [1] Si [2]No

87. Si no: Por qué no?
[1] No hay ninguna oferta? [2] Ud. no lo desea?
[3] Ud. no puede permitírselo por sus gastos? [4] Otros_____

88. Si sí: ¿Qué tipo de apoyo agrícola recibe Ud. actualmente y de qué organización viene el apoyo?

Tipo de servício agrícola	**Nombre de la(s) organización(es) que da(n) el servicio**	**¿Le ha sido útil? Si/No**
[1] Ayuda técnica (maquinas, fertilizantes...)		
[2] Nuevas variedades /semillas		
[3] Entrenamiento / talleres		
[4] Ayuda de la comercialización		
[5] Credito agrícola		
[6] Mejoramiento del suelo		
[7] Forestación		
[8] Dosificacion de animales mayores		
[9] otros		

89. ¿Qué tipo de apoyo agrícola le ayudaría a mejorar su trabajo? ¿Por qué?
_____

90. A Ud. le interesaría trabajar con nuevos métodos de cultivo? [1] Si [2]; No

91. A Ud. le interesaría trabajar con otras variedades nativas de papa? [1] Si [2]; No

92. A Ud. le interesaría trabajar con nuevas variedades comerciales de papas? [1] Si [2] No

93. ¿Qué cree Ud. que puede hacer una institución que trabaja en el area del cultivo de la papa para apoyarlo a mejorar sus condiciones de vida?_____

94. ¿Tiene algún otro comentario que hacer?_____

GRACIAS!

Annex V: Feedback leaflet: example of Huayta Corral

CARACTERIZACIÓN DE LA COMUNIDAD DE HUAYTACORRAL

Fundación de la comunidad	appr. 1972
Altitud	appr. 4200 s.n.m
Número de familias en la comunidad	62
Area total de la comunidad	1279 ha
Las 4 fuentes de ingreso más importantes para las famílias de la comunidad hoy	1: Papa nativa 2: Maca 3: Ovinos 4: Papa mejorada
Las 2 fuentes de ingreso más importantes para las famílias de la comunidad hace 15 años	1: Ganado 2: Papa nativa

¿QUÉ ROL TIENE LA PAPA EN LA COMUNIDAD?

Primeramiente había mucho ganado (ovino) en Huaytacorral, después incrementó la producción de la papa para vender en el mercado. Muchos comuneros siembran hoy más papa nativa y más papa mejorada que hace 15 años. Hay una riqueza de variedades da papas nativas. Tener su proprio germoplasma es bastante importante para la conservación de papas nativas.
Vários agricultores contratan tractores conjuntos. Pero hay limites del mercado, por eso la diversificación agrícola es bastante importante. Hoy día los campesionos de Huaytacorral siembran también mucha maca. La maca trae un mejor ingreso, pero también trae el peligro de desminuir la fertilidad del suelo.

SLE Centro de Estudios Avanzados para el Desarrollo Rural
Universidad Humboldt de Berlín

INFORMACIÓN SOBRE LA COMUNIDAD DE HUAYTACORRAL

Huaytacorral / Acostambo / Tayacaja / Huancaveliva

Asamblea comunal el 22 de agosto 2005

Un grupo de estudiantes extranjeros de la universidad de Berlín/Alemania ha realizado un estudio sobre el desarrollo agrícola en comunidades productoras de papa. Los estudiantes querian aprender sobre los cambios en la producción agrícola que ocurrieron en los últimos 15 años y como influenciaron la vida en la comunidad.

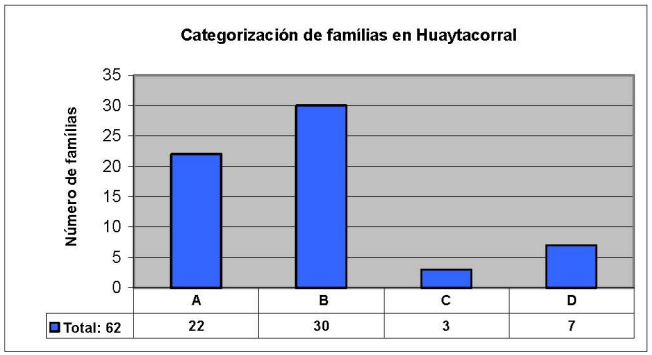
En este folleto les presentamos los resultados. Estuvimos muy contentos de estar en Huaytacorral y hemos aprendido mucho de ustedes. Les agradecemos mucho por el tiempo y la ayuda que nos han dado.

LA ASAMBLEA EN HUAYTACORRAL

Parte de este estudio eran asambleas con el objetivo común que todos los participantes – no solo los comuneros sino tambien los estudiantes de Alemania - sepan más sobre la situación y las condiciones de la vida en la comunidad.**"Imagínense una familia en su comunidad que está en una situación muy mala. Qué sería lo más importante para esta familia?"** se pregunto a la asamblea. La figura enseña los criterios que fueron mencionados en orden de importancia. Además la **línea de pobreza** que los comuneros trazaron para diferenciar los dos grupos **"Pobres"** y **"No Pobres"**.

20	Tener mobilidad necesária	No pobre
19	Herramientas mejoradas	
18	Crianza tecnificada de cuyes	
17	Mejoramiento de casa, servícios básicos, letrina	
16	Negociante mediano de papa	
15	Tener animales, tener guano de corral y yunta	
14	Tener terreno y sembrar papa, maca, buena cosecha	
13	Buena educación	
12	Buena alimentación	
11	Planificación familiar	
10	Tener buena salud	
9	Agua potable	
8	Trabajo temporal, herramientas básicas	Pobre
7	Salud básica	
6	Educación primaria	
5	Unión familiar y buena organización	
4	Vestimenta	
3	Casa con crianza de cuyes	
2	Apoyo, Aini	
1	Alimentación básica	

Cada familia fue categorizada hoy y hace 15 años en el grupo respectivo. Así se ve el movimiento que han hecho en su nivel de vida: Mientras várias familias se mantuvieron pobres **(A)** muchas familias salieron de la pobreza **(B)** en los últimos 15 años. Hay pocas familias que entraron en pobreza **(C)** y algunas familias que se mantuvieron no pobres **(D)**. Los resultados para la comunidad de Huaytacorral enseña la figura:



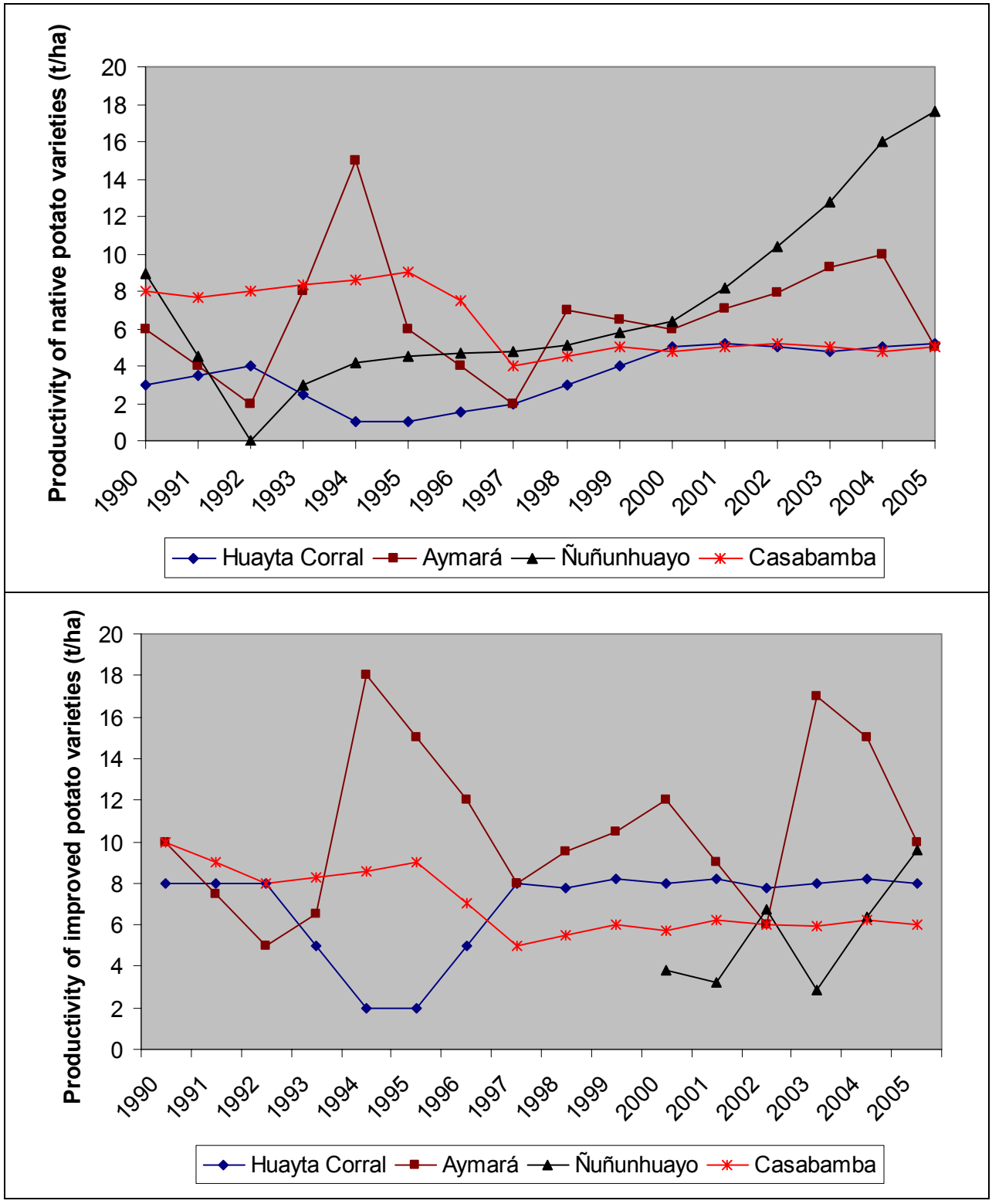
En general: **¿Cúales son las causas que han influido principalmente para que las familias salgan de la pobreza?**

Del día de la asamblea tenemos una primera impresión de las causas. La inversión en la papa combinada con la siembra de maca (diversificación) y la capacitación en el cultivo de la maca son las causas principales para salir de la pobreza. Tambien el acceso al crédito ha contribuido bastante. La tenencia de un negoico proprio es uno de los factores más importantes para mejorar las condiciones de vida de la família.

¿Qué factores han influido principalmente para que las familias se mantengan pobres?

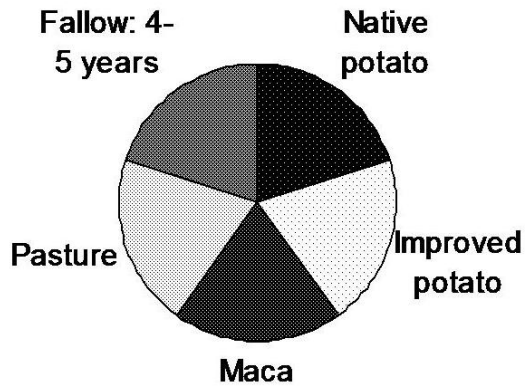
La edad avanzada (mayores de 60 años) y el fallecimiento o abandono del conyugue (mujeres viudas y madres solteras) son causas principales para se mantener pobre. Otros factores son enfermedades costosas, gastos en educación y mantenimiento de una familia numerosa. Otra causa es el acesso a terrenos fertiles y a mano de obra. Perdidas en la cosecha (plagas y heladas) han descapitalizado a muchas familias.

Annex VII: Dynamics of native and improved potato production in the participating communities as perceived by community authorities

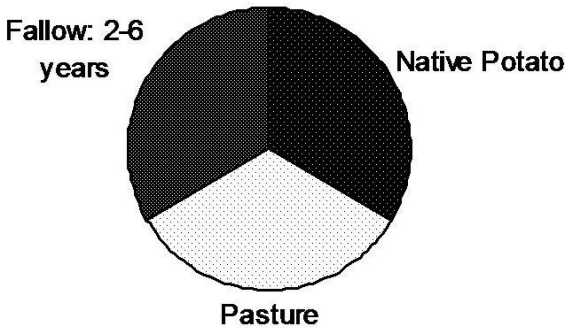


Source: Workshop with community authorities

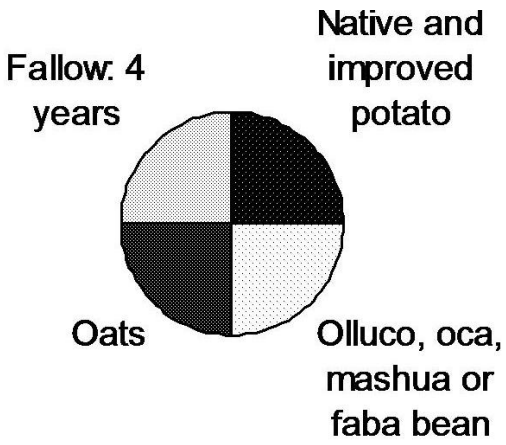
Annex VII: Changes in the rotation systems in the participating communities



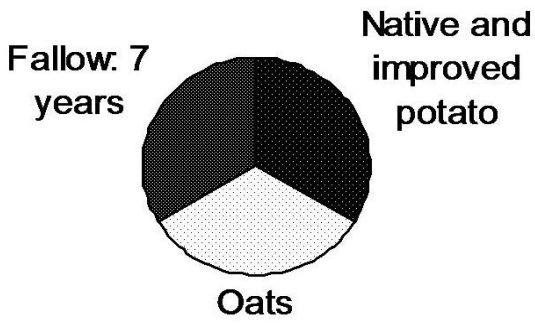
Huayta Corral today



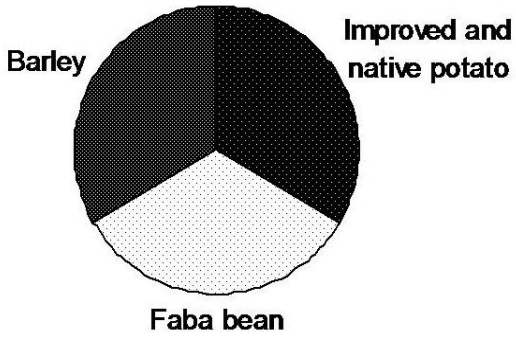
Huayta Corral 15 years ago



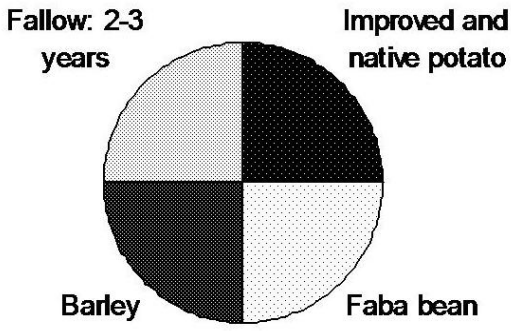
Aymará today



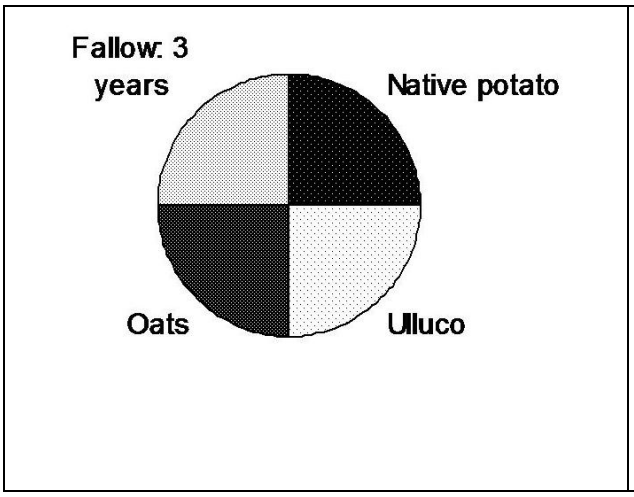
Aymará 15 years ago



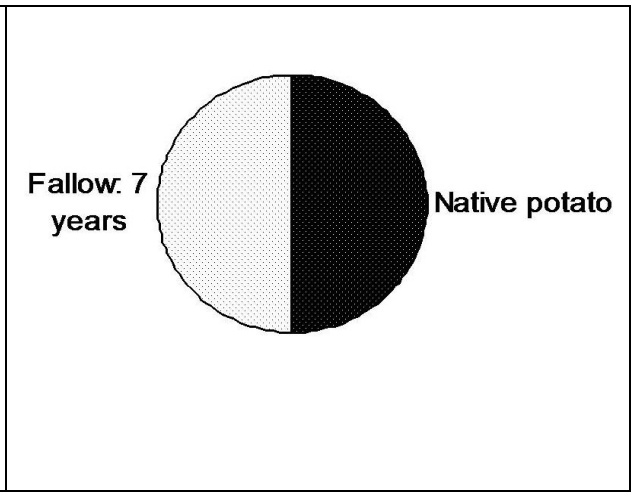
Casabamba today



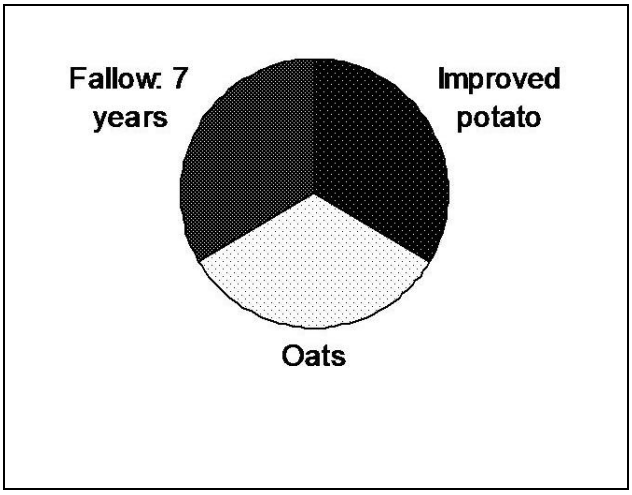
Casabamba 15 years ago



Ñuñunhuayo native potato rotation today



Ñuñunhuayo native potato rotation 15 years ago



Ñuñunhuayo improved potato rotation today

Annex VIII: List of potato varieties grown by interviewed farmers today and 15 years ago

The tables list the native and improved potato varieties, mentioned by the 120 interviewed farmers to be cultivated today and / or 15 years ago. This list is not meant to be complete.

Native potatoes *(Solanum tuberosum spp. andigena and 6 other native Solanum spp., e.g. pureja.)*

Name of potato variety	Cultivated today – number of entries	Cultivated 15 years ago – number of entries
Alianza	1	1
Amarilla Crespa	2	2
Amarilla del centro	60	44
Amarilla nativa	1	1
Azul Huayta	1	1
Azul waita	1	1
Camotillo	69	53
Caquita dechancho	1	1
Caramelita	0	1
Carnteña	0	1
Cerrenya	1	3
Chaglina	3	3
Chancha	1	1
Chaolina	1	0
Chocherces	0	1
Chuchillopaqui	0	1
Cochancara	0	1
Color	3	3
Combolito	0	1
Cuchiapaca	1	1
Culle	0	3
Cully	1	1
Hrasa hrasi	0	1
Huamantanga	68	51
Huanuquenas	1	0
Huaorosh	2	2

Huarihuayta	1	1
Huayro rojos	52	49
Huayta chuco	6	3
Huejo	1	1
Huinchina	0	1
Huyatoyarro	0	2
Iz - iz	2	2
Jashpan	1	1
Jayashiut	1	1
Larga caramelo	0	1
Leche morada	1	2
Lima amarillo	0	1
Lima Huayro	0	1
Limeña	23	19
Mezcla (Chajro)	46	36
Molapa runto	1	0
Muchere	1	1
Muru huayro	67	53
Negrita	0	1
Panua	0	1
Papa negra	1	1
Papa pashon	1	1
Papa piña	1	2
Papa piush	2	2
Papa rosa	2	3
Pashon	1	1
Pastinapapa	1	1
Peruana	2	2
Peruanita	100	39
Pochovio	1	1
Pogya	1	1
Poquia	0	1
Prima de viuda	1	1
Pucjlla	1	0
Punua	1	1

Pussla	1	1
Quishcamatanca	1	1
Retipa	1	0
Shiri	12	11
Shuitu	0	1
Siny	1	1
Smanin	1	1
Suituchi	1	1
Tanmena	1	0
Targaja	0	1
Tarma	0	1
Trajin	2	2
Tunibay	1	1
Tupi	0	1
Uberlono	1	0
Yanahuayro	2	2

Improved potato varieties *(Solanum tuberosum ssp. tuberosum)*

Name of potato variety	Cultivated today – number of entries	Cultivated 15 years ago – number of entries
Amarilis	7	10
Andina	56	1
Antarqui	0	1
Bella	1	1
Caballero	0	3
Canchán	19	26
Capiro	1	0
Casablanca	0	1
Centeña	1	1
Especial	0	1
Huancayo	1	5
Liberteña	4	2
Maria huanca	2	2
Mariva	6	27
Perricholi	9	18
Revolución	13	34
Rosada	0	1
Serrana	1	0
Tomasa	1	6
Villa	1	1
Yungay	95	65

Annex XI: Characterization of poor / non-poor by communities

Poor / Non-poor as characterized by the assembly of Huayta Corral

NON POOR	Well fed, balanced diet containing guinea pigs, vegetables, eggs, cheese, milk
	Sufficient water
	Healthy, access to basic health services and medicine
	Family planning
	Secondary education
	More than 1 ha cultivation area, cultivation of potato and maca, marketing of their products
	Purchase of food
	Livestock (medium and big animals such as cattle, sheep)
	Bigger house with a pile roof, wooden floor, 2 stores, possession of commodities (radio, TV)
	Own tools for agricultural production like diffusion backpacks, *chaquitajllia*, plough, some rent tractors
	Have access to a truck (*Camión 500*)
POOR	Basic, unbalanced food 2 times a day, no fruits, few vegetables
	Simple adobe houses
	Small livestock for own consumption (e.g. guinea pigs)
	Second hand cloth, patched cloth
	Ill health, bad nutrition status (undernourished / malnourished)
	Primary education, low education level
	Low paid wage labor on daily base
	Agricultural production tools have to be rented or borrowed
	Less than 0.3 ha cultivated land

Source: Community assembly

Poor / Non-poor as characterized by the assembly of Aymará

NON POOR	Access to better health service
	Good and balanced diet, 3 times a day containing soup and main dish
	Possession of more than 20 sheep
	4 ha and more of cultivation area
	Possession of electronic devices
	Gas stove
	An own house with tile roof
	Access to superior education (College, University)
	Better communal organization
POOR	Unbalanced diet (only potato and chuño) 3 times per day in little quantity
	Only access to basic health services in Pazos
	Primary education to the 4th grade
	Wage labor on daily base
	Economic situation is bad, not even allows to satisfy basic needs
	Simple houses with thatched roof; 2-3 rooms (kitchen, dormitory, storage)
	Deficient communal organization, starting to be organized
	Only small animals like poultry, guinea pigs

Source: Community assembly

Poor / Non-poor as characterized by the assembly of Ñuñunhuayo

NON POOR	3 meals a day, once a week vegetables, milk, meat
	House with tile roof
	Intensification of potato production (native and improved), use of certified seeds
	Possession of big animals such as alpacas, lamas, sheep, cattle
	Secondary education (outside the village e.g. in the city)
	Purchase of good clothes, leather shoes
	Access to primary health services, access to hospitals and treatments in clinics
	No cuttting down of trees, no burning of plastic bags, protection of soil
POOR	Few food, insufficient and unbalanced diet containing only potato, ulluco, *chuño*
	Simple cloth self made of sheep-wool
	Simple adobe housing
	Self treatment of sicknesses with herbs, traditional medicine, no access to basic health services and transport
	No writing skills, low education level, sometimes primary school is not finished because they have to pasture animals
	Cultivation of only native potatoes without chemical fertilizers, only with ash and dung, production for own consumption, low yields
	Own only small livestock (guinea pigs, poultry) mainly for self consumption

Source: Community assembly

Poor / Non-poor as characterized by the assembly of Casabamba

NON POOR	House with tile roof and 3-4 rooms
	Possession of 6 cattle, sheep, pigs, guinea pigs, poultry, rabbits
	Possession of 2 ha of cultivation area
	Secondary education, some are qualified as agrarian technicien
	Possess sufficient money to acquire electronic goods (e.g. TV, iron, blender)
	Balanced diet of meat, fish, milk, chicken, rice; drink 3 times a day
	Access to basic health services and hospitals
	Can afford medicine
	Possession of a bicycle
POOR	Little food in quantity and quality, unbalanced, only potato, ulluco
	Food 2 times a day, sometimes nothing, chew coca against hunger
	Simple, sometimes rugged clothes, self made, plastic shoes or bar foot
	Bad health, many people are sick, use of traditional medicine
	No access to hospitals
	Only primary education
	Occasional wage labor on a daily base for 6 NS / day (1.8 US$ / day)
	House of adobe or stone with thatched roof
	Possession of livestock of medium and small animals

Source: Community assembly

Annex X: Diet balance in the categories of well-being (food items times / week)

Category	Milk	Eggs	Meat / poultry/ fish	Beans	Vegetables	Fruit	Potato/ ART's	Rice	Noodles	N
RP	2.3 (1.3)[101]	1.5 (1.4)	1.5 (1.7)	1.6 (1.8)	5.6 (5.2)	1.6 (1.2)	6.7 (6.6)	3.8 (3.1)	2.5 (1.6)	21
EP	3.1 (2.2)	1.7 (1.2)	1.5 (1.3)	2.1 (1.6)	6.2 (4.9)	2.0 (1.2)	6.9 (6.8)	5.0 (3.2)	2.6 (1.8)	47
BP	2.5 (3.8)	1.2 (1.8)	1.1 (1.4)	2.0 (2.2)	5.8 (5.4)	2.4 (2.2)	6.2 (6.3)	2.8 (3.7)	2.0 (3.2)	9
RNP	3.2 (3.1)	2.4 (1.8)	1.6 (1.5)	2.2 (2.3)	6.0 (5.9)	2.0 (2.1)	6.8 (6.8)	4.1 (4.1)	2.7 (2.5)	43
Total mean	3.0 (2.5)	1.9 (1.5)	1.5 (1.5)	2.1 (2.0)	6.0 (5.3)	2.1 (1.6)	6.8 (6.7)	4.3 (3.5)	2.6 (2.1)	120

Source: Household survey

Annex XI: Food-groups intake per week for male and female-headed households

	Protein intake / week	Carbohydrate intake / week	Fiber intake / week	Ratio protein / carbohydrate intake
Female (23)	8.0 (8.3)	12.2 (11.8)	8.0 (6.7)	0.70 (0.74)
Male (97)	8.5 (7.2)	14.0 (12.5)	8.1 (7.0)	0.64 (0.74)
Total (120)	8.4 (7.4)	13.6 (12.4)	8.1 (6.9)	0.66 (0.74)

Source: Household survey

[101] Numbers in brackets are values of the respective variable 15 years ago.

Annex XII: Food-groups intake per week for education groups

Education of household head	N	Protein Intake / week	Carbohdrate intake / week	Fiber intake / week	Ratio protein/ carbohydrate intake
None	16	7.0 (7.6)	10.9 (10.9)	7.50 (6.4)	0.71 (1.67)
Non-finished primary	33	8.3 (7.1)	14.0 (11.4)	8.0 (7.1)	0.61 (0.62)
Primary	35	8.0 (7.2)	14.3 (13.3)	7.7 (6.5)	0.57 (0.54)
Secondary	35	9.6 (7.7)	13.8 (13.0)	8.8 (7.5)	0.76 (0.63)
Higher	1	9.0 (11.0)	15.0 (15.0)	7.0 (7.0)	0.60 (0.73)
Total (120)	120	8.4 (7.4)	13.6 (12.4)	8.1 (6.9)	0.66 (0.74)

Education of spouse	N	Protein intake / week	Carbohydrate intake / week	Fiber intake / week	Ratio protein / carbohydrate intake
None	13	7.2 (8.7)	10.4 (10.2)	6.2 (5.2)	0.74 (2.01)
Non-finished primary	43	8.7 (6.3)	14.2 (12.3)	8.8 (7.5)	0.68 (0.53)
Primary	36	8.7 (8.0)	14.6 (13.3)	8.3 (7.0)	0.61 (0.61)
Secondary	5	7.0 (5.2)	12.4 (10.6)	8.4 (6.4)	0.59 (0.50)
Higher	1	12.0 (11.0)	10.0 (9.0)	10.0 (9.0)	1.20 (1.22)
Total (120)	120	8.4 (7.4)	13.6 (12.4)	8.1 (6.9)	0.66 (0.74)

Source: Household survey

Annex XIII: Perceived reasons for no recent agricultural support in the communities

Numbers of Households	No offer / opportunity	No interest	Not affordable	Time constraints	Total
Huayta Corral	16	10	2	0	**28**
Aymará	16	11	1	2	**30**
Ñuñunhuayo	3	4	2	0	**9**
Casabamba	13	3	0	0	**16**
Total	**48**	**28**	**5**	**2**	**83**

Source: Household survey

Annex XIV: Participation in agricultural training courses in Huayta Corral

	PRONA-MACHCS	CARITAS	MINAG	CIP	INIEA	FON-CODES	CARE
RP	4	2	0	0	0	0	0
EP	9	3	2	1	1	1	1
BP	0	0	0	0	0	0	0
RNP	4	0	1	0	0	0	0
Total	17	5	3	1	1	1	1

Source: Household survey, 32 households were interviewed, total number of entries: 29

Annex XV: Participation in agricultural training courses in Aymará

	PRONA-MACHCS	SENASA	MINAG	CIP	INIEA	SEPAR
RP	1	0	0	1	1	0
EP	3	1	0	3	5	0
BP	1	0	0	0	1	0
RNP	2	1	1	3	1	1
Total	7	2	1	7	8	1

Source: Household survey, 41 households were interviewed, total number of entries: 26

Annex XVI: Participation in agricultural training courses in Ñuñunhuayo

	PRONA MACHCS	SENASA	MINAG	CIP	INIEA	CNA
RP	1	0	0	1	0	0
EP	11	3	2	11	1	0
BP	0	0	0	0	0	0
RNP	6	1	2	6	0	1
Total	18	4	4	18	1	1

Source: Household survey, 30 households were interviewed, total number of entries: 46

Annex XVII: Participation in agricultural training courses in Casabamba

	PRONA-MACHCS	CIP	INIEA	TALPUY
RP	0	0	0	0
EP	1	0	0	0
BP	0	0	0	0
RNP	6	4	2	3
Total	7	4	2	3

Source: Household survey, 17 households were interviewed, total number of entries: 16

Annex XVIII: Agricultural support requested from an institution working in the area of potato

	Seed / new varie-ties		Infor-mation about good seeds		Infor-mation on pest manage ment		Pesti-cides / fertilizer		Training on ferti-lizer / pesti-cide		Training in agricult ure		Soil conser-vation		Commer-cializa-tion		Processing / value adding		Agri-cultural credit		Total	
	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%	No	%
RP	5	16	4	13	2	6	5	16	0	0	5	16	0	0	4	13	1	3	5	16	31	15
EP	12	14	6	7	5	6	9	11	6	7	25	30	0	0	12	14	1	1	7	8	83	40
BP	3	16	4	21	3	16	2	10	0	0	6	32	0	0	1	5	0	0	0	0	19	9
RNP	8	11	8	11	8	11	5	6	5	6	25	32	3	4	5	6	2	3	6	8	75	36
Total	28	13	22	11	18	9	21	10	11	5	61	29	3	1	22	11	4	2	18	9	208	100

Source: Household survey, total number of entries: 208

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